

Baseline Ecological Risk Assessment

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Prepared for:
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LLC

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July 29, 2019

Volume II of II



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Appendix A Baseline Ecological Risk Assessment Work Plan Interim Deliverable Technical Memoranda



Appendix A1 Technical Memorandum: Proposed Refined Ecological Screening Values (ESVs) to Support the Baseline Ecological Risk Assessment at the Columbia Falls Superfund Site

Date: February 21, 2019

To: Mike Cirian, USEPA

From: Laura Jensen, Roux

CC: John Stroiazzo, Glencore
Steve Wright, CFAC
Dick Sloan, MDEQ
Andrew Baris, Roux
Michael Ritorto, Roux
Gary Long, EHS Support, LLC

Subject: **Technical Memorandum: Proposed Refined Ecological Screening Values to Support the Baseline Ecological Risk Assessment at the Columbia Falls Superfund Site**
Former Columbia Falls Aluminum Company Aluminum Reduction Facility
Columbia Falls, Montana

On behalf of Columbia Falls Aluminum Company, LLC (CFAC), Roux Environmental Engineering and Geology, D.P.C. (Roux) and EHS Support, LLC prepared the attached Technical Memorandum for Proposed Refined Ecological Screening Values (ESVs) to Support the Baseline Ecological Risk Assessment (BERA) for the CFAC Superfund Site in Columbia Falls, Montana. This memorandum has been prepared as part of the ongoing Remedial Investigation/Feasibility Study (RI/FS) being conducted pursuant to the Administrative Settlement Agreement and Order on Consent (AOC) dated November 30, 2015 between CFAC and the United States Environmental Protection Agency (USEPA) (CERCLA Docket No. 08-2016-0002).

Should there be any questions or comments on this submission, please do not hesitate to contact me at (631) 230-2300.

Sincerely,


Laura Jensen, P.G. (NY)
Senior Hydrogeologist

MEMO

To: Andrew Baris, Roux

From: Gary Long

CC: Michael Ritorto, Roux
Laura Jensen, Roux
Tom Biksey, EHS Support

Date: February 21, 2019

Re: *Technical Memorandum: Proposed Refined Ecological Screening Values (ESVs) to Support the Baseline Ecological Risk Assessment at the Columbia Falls Superfund Site*
Former Columbia Falls Aluminum Company Aluminum Reduction Facility
Columbia Falls, Montana

Introduction

This technical memorandum describes the approach for developing refined ecological screening values (ESVs) to support the selection of constituents of potential ecological concern (COPECs) in the Baseline Ecological Risk Assessment (BERA) for the Columbia Falls Aluminum Company (CFAC) Superfund Site in Columbia Falls, Montana. This technical memorandum was prepared as an interim deliverable to supplement the general risk assessment framework provided in the *Baseline Ecological Risk Assessment Work Plan* (BERA WP) submitted to the United States Environmental Protection Agency (USEPA) and Montana Department of Environmental Quality (MDEQ) in November 2017 and revised in May 2018 (EHS Support, 2018a).

As stated in the BERA WP, refinement of COPECs identified in the Screening-Level Ecological Risk Assessment (SLERA) will be performed as part of the BERA Problem Formulation (EHS Support, 2018a). COPEC refinement in the BERA Problem Formulation is consistent with USEPA *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessment* (USEPA, 2001). The refinement of COPECs identified in the SLERA is a fundamental step in the BERA Problem Formulation to focus BERA analyses on COPECs that are most likely to drive risk management decision-making for the Site. The intent of the refinement is to focus and streamline the overall Ecological Risk Assessment Guidance for Superfund (ERAGS) process by considering additional components early in the BERA process.

COPEC refinement will be performed on the combined datasets from the Phase I and Phase II Site Characterization sampling for ecological exposure media (EHS Support, 2018a). Screening of constituents using the combined Phase I and Phase II datasets for each exposure area and exposure medium will be based on a tiered approach:



- 1) Maximum exposure point concentrations (EPCs) of constituents in Phase I and Phase II Site Characterization datasets for each ecological exposure area will be initially compared to minimum ESVs presented in the SLERA.
- 2) Constituents identified as COPECs in the initial screening will be refined based on the re-screening of COPECs using comparisons of maximum EPCs to refined ESVs.

The technical memorandum presents the rationale for selecting refined ESVs to support the COPEC refinement process in the BERA. The comparisons of maximum exposure concentrations to minimum ESVs, consistent with Step 1 of the COPEC refinement process, have a low probability of resulting in false negatives in the screening process (i.e., eliminating COPECs that may cause adverse effects due to exposure). However, the minimum ESVs applied in Step 1 of the screening do not represent the range of no observed effect concentration (NOEC) endpoints that are protective of chronic exposure. Therefore, these comparisons cannot be used to conclude that exposure to a COPEC is likely to result in adverse effects. The findings of Step 1 of the screening process only indicate that certain COPECs and associated exposure pathways require further evaluation. Refined ESVs were identified to represent values that are protective of chronic exposure but represent a broader range of NOEC endpoints that will be used to focus the list of COPECs requiring further evaluation in the BERA.

Refined ESVs are identified in this technical memorandum for the list of COPECs identified for soil, sediment, and surface water in the SLERA based on the screening of Phase I Site Characterization data and additional COPECs identified in the BERA WP based on detected constituents lacking ESVs. If additional COPECs are identified during Tier 1 screening once the Phase I and Phase II Site Characterization datasets are combined, the selection of refined ESVs for the Tier 2 screening will follow the approach outlined in this technical memorandum for additional COPECs. The following sections describe the technical rationale for the selection of refined soil, sediment, and surface water ESVs in the COPEC refinement process in the BERA Problem Formulation.

Refined Soil ESVs

Refined soil ESVs will be based on peer-reviewed, multi-trophic level soil screening criteria, consistent with the USEPA approach for deriving Ecological Soil Screening Levels (Eco-SSLs). Eco-SSLs were derived as risk-based soil screening levels through a peer review process for the protection of multiple terrestrial receptor categories (USEPA, 2005):

- Terrestrial plants
- Soil invertebrates
- Birds
- Mammals

Like Eco-SSLs, the Los Alamos National Laboratory (LANL) ECORISK Database (Release 4.1) presents conservative screening values based on modeled exposure for receptors in various trophic levels (LANL, 2017). Consistent with the Eco-SSL approach, the ECORISK Database used geometric mean concentrations of NOEC endpoints as screening criteria for each terrestrial receptor category. These LANL screening values were used to supplement the Eco-SSL values to develop refined ESVs. Screening values for the various terrestrial trophic level receptors evaluated in both the ECORISK Database and the Eco-SSL guidance were pooled, and the minimum screening criterion for each COPEC was identified as the refined soil ESV (**Table 1**).



Refined ESVs for chemicals lacking screening values in the LANL and/or Eco-SSL datasets were identified from other available sources in the literature. USEPA Region 5 ecological screening levels (ESLs) (USEPA, 2003a) were preferentially used for this purpose. ESLs provide protective benchmarks for contaminants in soil, and consider direct, as well as indirect (i.e., food-chain) exposure pathways. If ESLs were not available, other accepted sources for soil benchmarks were also considered (e.g., Efroymson et al., 1997a; Efroymson et al., 1997b).

Given that refined ESVs are protective of direct contact and indirect ingestion exposure pathways, constituents with maximum EPCs lower than the refined ESVs will not be evaluated further in the BERA. In the absence of sufficient data to refine soil ESVs, the conservative minimum ESV used in the SLERA will be retained. However, further literature review may be conducted to refine ESVs for these COPECs in the BERA Problem Formulation. Refined soil ESVs for the initial COPECs identified in the SLERA and BERA Work Plan are presented in **Table 1**; the rationale for the selection of refined ESVs is presented in the following sections.

Inorganic COPECs

With one exception, the lowest screening value from the LANL ECORISK Database or the USEPA Eco-SSLs will be used as refined ESVs for metal and other inorganic COPECs (**Table 1**). The refined ESV for chromium was the only metal for which the lowest screening value from the two primary sources was not selected.

Refined ESVs for chromium will be identified from toxicity studies conducted based on exposure to the corresponding form of chromium measured in soils at the Site. Chromium is present primarily in the trivalent [Cr(III)] oxidation state under typical soil conditions (USEPA, 2008a). Hexavalent chromium [Cr(VI)] is only stable in oxidizing soils at moderate pH levels, whereas the Cr(III) is the dominant species under moderately oxidizing to reducing conditions. Additionally, the reduction-oxidation transformations between the two valence states are not fully reversible. Cr(VI) will reduce to Cr(III) in a reducing environment, but once reduced, Cr(III) will not readily re-oxidize to Cr(VI) under oxidizing conditions.

A select number of soil borings will be analyzed for Cr(VI) and total chromium in the Phase II Site Characterization to reduce uncertainty in the risk assessment of chromium in site soils (Roux Associates, 2018a). Cr(III) concentrations will be estimated as the difference in concentrations between total chromium and Cr(VI) results. Estimated concentrations of Cr(III) and measured concentrations of Cr(VI) will be used to develop a site-specific ratio of Cr(III):Cr(VI). The site-specific Cr(III):Cr(VI) ratio will be applied to Phase I and Phase II samples analyzed only for total chromium to estimate the relative concentration of Cr(III) and Cr(VI) in the sample. Refined ESVs derived based on Cr(VI) toxicity studies will be applied to the measured or estimated Cr(VI) concentrations in soil; refined ESVs for Cr(III) or total chromium will be applied to estimated concentrations of Cr(III) in soil (**Table 1**).

Numeric ESVs were not identified for aluminum and iron in soil in the Eco-SSL or LANL ECORISK database. USEPA Eco-SSL guidance indicates that total aluminum measurements are not considered suitable or reliable for the prediction of potential toxicity and bioaccumulation of aluminum in soils (USEPA, 2003b). The Eco-SSL guidance indicates that potential ecological risks associated with aluminum are based on soil pH, with aluminum being identified as a COPEC only at sites where soil pH is less than



5.5 (USEPA, 2003b). Therefore, the screening of aluminum as a COPEC in site soils will be based on measured soil pH values as an indication of the potential bioavailability and toxicity of aluminum concentrations. Like aluminum, numeric Eco-SSLs were not derived for iron because its bioavailability and toxicity are dependent upon site-specific conditions, including soil pH. In well-aerated soils with pH values between 5 and 8, iron is not expected to be toxic to plants (USEPA, 2003c). Consistent with Eco-SSL guidance, the potential bioavailability and toxicity of iron will be based on site-specific measurements of soil pH.

For metal COPECs, mean concentrations representative of unimpacted soils analyzed as part of the Montana State Background Investigation (MSBI; Hydrometrics, 2013) were presented in the BERA Work Plan to provide regional context to concentrations of inorganic chemicals detected in soil. Further characterization of background conditions is proposed as part of the Phase II Site Characterization (Roux Associates, 2018b; Roux Associates, 2018c). Site-specific background data collected as part of the Phase II Site Characterization will supplant MSBI regional soil data in the COPEC refinement process conducted as part of the BERA Problem Formulation. In addition to comparisons to refined ESVs, concentrations of metals in soil will also be compared to representative, site-specific background concentrations to evaluate whether detected concentrations are consistent with naturally occurring concentrations.

As stated in the BERA Work Plan and consistent with *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments* (USEPA, 2001), representative background concentrations calculated from Phase II Site Characterization background data will be used as the refined ESV to evaluate the need for further consideration of essential nutrients in the BERA. Because the soil background data from the Phase II Site Characterization sampling have not been compiled and representative background concentrations for each metal have not yet been calculated or approved, only the refined ESVs based on toxicological effects are presented in this interim deliverable.

Organic COPECs

LANL and/or USEPA Eco-SSLs values were available for many organic COPECs (**Table 1**). For the organic COPECs lacking LANL or Eco-SSL values, refined ESVs will be based on USEPA Region 5 ESLs (USEPA, 2003a) for 16 non-polycyclic aromatic hydrocarbons (PAH) organic compounds and based on an Oak Ridge National Laboratory (ORNL) benchmark for 4-nitrophenol in soil (Efroymson et al., 1997a). As shown in **Table 1**, the minimum ESV used in the SLERA was retained for organic COPECs lacking refined ESVs from these sources.

Exposure to the mixture of 17 dioxin/furan compounds analyzed in surficial (0-0.5 ft) and shallow (0.5-2 ft) soil samples will be evaluated relative to the toxicity of 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) using toxicity equivalency factors (TEFs) developed for birds and mammals by the World Health Organization (Van den Berg et al., 2006; Van den Berg et al., 1998; USEPA, 2008b). For dioxin/furan screening, measured concentrations of the 17 dioxin/furan compounds in surface and shallow soil samples will be multiplied by compound-specific TEFs to calculate toxicity equivalence concentrations to 2,3,7,8-TCDD ($TEC_{2,3,7,8-TCDD}$) for each compound, assuming consistent bioaccumulation for the 17 dioxin/furan compounds. The summed $TEC_{2,3,7,8-TCDD}$ values for each sample will be compared to the refined ESV for 2,3,7,8-TCDD, which is identified in **Table 1** as 0.00000029 mg/kg based on the protection of mammalian wildlife in the LANL ECORISK database. Multiple options are available for addressing surrogate values for nondetect congener results (USEPA, 2008b). The CFAC BERA will use 0,



0.5 x the method detection limit (MDL) and the MDL as three scenarios to bracket the range of possible concentrations owing to contributions of results that are nondetect. The MDL represents the lower limit of concentrations detectable by the analytical method. Therefore, any concentrations above the MDL are typically detectable values, and are recorded at the concentration reported by the laboratory. Thus, the MDL represents a conservative upper limit for the potential concentration of dioxin in a sample producing a nondetect result. In some cases, dioxin congener results that had a reported laboratory value were flagged with a laboratory qualifier “B” (indicating blank contamination) and a validation qualifier of “U” (indicating that the influence of the blank contamination compromised the confidence of determining if the constituent was present in the sample at all). In such cases, the reported laboratory value will conservatively be used as the surrogate value for the nondetect rather than the MDL. All reported and surrogate values will then be multiplied by the appropriate bird or mammal TEF, and the TEF-adjusted concentrations will then be summed to develop the $TEC_{2,3,7,8-TCDD}$.

Given that some organic COPECs in soils may be derived from regional sources unrelated to site activities (e.g., PAHs), representative background concentrations derived from the background investigation that will be conducted as part of the Phase II Site Characterization sampling will be compared to measured concentrations in site datasets to further refine the list of organic COPECs for evaluation in the BERA (Roux Associates, 2018c).

Refined Sediment ESVs

Refined ESVs for sediment will be based primarily on consensus-based criteria and equilibrium partitioning (EqP)-based criteria protective of direct contact toxicity pathways to benthic organisms. Given that sediment ESVs are not derived for the protection of indirect exposure through ingestion (e.g., bioaccumulation/biomagnification pathways), potential ingestion exposure pathways for detected bioaccumulative COPECs will be evaluated consistent with the approach outlined in the *Technical Memorandum: Proposed Wildlife Exposure Modeling Approach to Support the Baseline Ecological Risk Assessment at the Columbia Falls Superfund Site* (EHS Support, 2018b).

Refined ESVs for sediment COPECs identified in the SLERA and BERA Work Plan are provided in **Table 2**; the rationale for the selection of refined ESVs is presented in the sections below. In the absence of sufficient data to refine sediment ESVs, the conservative minimum ESV used in the SLERA will be retained. However, further literature review may be conducted to refine ESVs for these COPECs in the BERA Problem Formulation.

Inorganic COPECs

Refined sediment ESVs for metal COPECs will be using the consensus-based threshold effects concentrations (TEC) approach (MacDonald et al., 2000), as available. In the absence of consensus-based TECs, refined ESVs will be selected from sources in the following order of preference:

- USEPA Region 5 ESLs
- USEPA Region 3 Biological Technical Assistance Group (BTAG) Freshwater Sediment Screening Benchmarks
- Threshold Effect Levels (TELs) for *Hyalella azteca* (USEPA, 1996; Ingersoll et al., 1996)



The refined ESV for total cyanide of 0.1 mg/kg will be based on the USEPA Region 3 BTAG screening value, which was adopted from Persaud et al. (1993). The minimum ESV previously used in the SLERA (0.0001 mg/kg) was based on the USEPA Region 5 ESL for total cyanide, which also cited Persaud et al. (1993) as a source. However, USEPA Region 5 erroneously presented the Persaud et al. (1993) value as 0.0001 mg/kg. Therefore, the correct value of 0.1 mg/kg from Persaud et al. (1993) will be used as the refined ESV for total cyanide in sediment.

Inorganic COPECs in sediment will also be evaluated relative to site-specific background data collected as part of the Phase II Site Characterization to further refine sediment COPECs in the BERA (Roux Associates, 2018c). As stated in the BERA Work Plan and consistent with USEPA (2001), representative background concentrations calculated from Phase II Site Characterization background data will be used as the refined ESV to evaluate the need for further consideration of essential nutrients in the BERA (Table 2).

Organic COPECs

Refined ESVs for organic COPECs in sediment will be based primarily on EqP-based criteria protective of direct contact toxicity pathways to benthic organisms. Refined ESVs for PAHs in sediment will be based on USEPA *Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures* (USEPA, 2003d). Exposure to PAH mixtures in sediment will be evaluated for potential additive narcotic effects to benthic organisms based on the sum of equilibrium partitioning sediment benchmark toxic units ($\sum$ ESBTUs) calculated from individual PAH compounds:

$$\sum ESBTU_{FCV,Total} = \sum_{i=1}^{16} \frac{C_{oc,PAHi}}{C_{oc,PAHi,FCVi}} \times UF$$

where:

- $\sum ESBTU_{FCV,Total}$ = Sum of ESBTUs for the PAH mixture based on 34 PAH compounds (unitless)
- $C_{oc,PAHi}$ = Organic carbon normalized concentration of PAH *i* ($\mu\text{g/g}_{oc}$)
- $C_{oc,PAHi,FCVi}$ = Organic carbon normalized critical concentration of PAH *i* based on the final chronic value (FCV; $\mu\text{g/g}_{oc}$)
- UF = Uncertainty factor to estimate the toxicity of total PAHs (based on 34 PAHs – 18 parent and 16 alkylated compounds)

$\sum$ ESBTU values less than or equal to 1.0 are considered acceptable for the protection of benthic invertebrate receptors; values exceeding 1.0 indicate a potential for narcotic effects in benthic receptors (USEPA, 2003d).

Sediment samples collected in the Phase I Site Characterization were analyzed for 16 of the 34 PAH compounds included in the USEPA ESB model¹; therefore, for the Phase I data, a site-specific uncertainty

¹ Analyzed PAH compounds include: naphthalene, acenaphthylene, acenaphthene, fluorene, anthracene, phenanthrene, pyrene, fluoranthene, benz(a)anthracene, chrysene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene.



factor (UF) or site-specific relationship will be applied to the $\sum \text{ESBTU}$ values calculated based on 16 compounds ($\sum \text{ESBTU}_{\text{FCV},16}$) to estimate $\sum \text{ESBTU}_{\text{FCV},\text{Total}}$. Sediment samples collected from select stations in the Phase II Site Characterization sampling will be analyzed for the 34 PAH compounds included in the USEPA ESB model; therefore, $\sum \text{ESBTU}_{\text{FCV},\text{Total}}$ values will be calculated directly based on the concentrations of the 34 PAH compounds measured in these samples.

Site-specific relationships will be developed to estimate the potential toxicity of unmeasured PAHs in the $\sum \text{ESBTU}$ calculation in samples where only 16 compounds were analyzed. Site-specific relationships will be evaluated between $\sum \text{ESBTU}$ values calculated based on 34 compounds ($\sum \text{ESBTU}_{\text{FCV},34} = \sum \text{ESBTU}_{\text{FCV},\text{Total}}$) and 16 compounds ($\sum \text{ESBTU}_{\text{FCV},16}$). Site-specific ratios of $\sum \text{ESBTU}_{\text{FCV},34} : \sum \text{ESBTU}_{\text{FCV},16}$ may be developed as UFs to account for unmeasured PAHs in samples analyzed for 16 PAH compounds. The development of UFs based on $\sum \text{ESBTU}_{\text{FCV},34} : \sum \text{ESBTU}_{\text{FCV},16}$ ratios is consistent with the estimation of UFs in USEPA (2003d); however, the use of site-specific ratios provides more relevant UFs for PAH mixtures at the Site. Alternatively, $\sum \text{ESBTU}_{\text{FCV},\text{Total}}$ values may be estimated using site-specific linear regression models developed based on paired $\sum \text{ESBTU}_{\text{FCV},16}$ and $\sum \text{ESBTU}_{\text{FCV},34}$ values at stations where 34 PAH compounds are analyzed, provided a significant linear relationship can be derived. The use of site-specific relationships to predict $\sum \text{ESBTU}_{\text{FCV},34}$ from $\sum \text{ESBTU}_{\text{FCV},16}$ in historical samples is intended to reduce the uncertainty of applying generic UFs provided in USEPA (2003d) to account for the potential toxicity of unmeasured PAHs in the $\sum \text{ESBTU}$ calculation.

The availability of ESVs for non-PAH semi-volatile organic compound (SVOC) COPECs is limited (**Table 2**). An EqP-based sediment benchmark provided in USEPA (2008c) will be used as a refined ESV for dibenzofuran. An EqP-based sediment benchmark for 4-methylphenol adopted by USEPA Region 5 as an ESL will be used as a refined ESV for 3- & 4-methylphenol. The EqP-based sediment benchmark for 4-methylphenol was lower than the USEPA Region 5 EqP-based sediment benchmark for 3-methylphenol; therefore, the refined ESV will be conservative based on the assumption that the 3- & 4-methylphenol concentration consists entirely of 4-methylphenol.

ESVs were not identified for other non-PAH SVOC COPECs. However, refined ESVs may be calculated using an EqP model if the review of the combined Phase I and Phase II Site Characterization data indicates frequent detection of these non-PAH SVOC COPECs (greater than 5 percent of samples²). For select nonionic organic constituents, refined ESVs will be based on sediment quality benchmarks (SQBs) calculated using an EqP model (USEPA, 2008c). SQBs represent concentrations in bulk sediment that, at equilibrium, would result in partitioning to sediment pore water at concentrations equivalent to NOEC water quality benchmarks (WQB_{NOEC}) based on constituent-specific organic carbon-water partitioning coefficients (K_{oc}):

$$\text{SQB}_{\text{NOEC}} = (f_{\text{oc}} \times K_{\text{oc}} \times \text{WQB}_{\text{NOEC}})$$

where:

² USEPA (2001) provides for the refinement of COPECs based on frequency and magnitude of detection. Assuming the Phase I and Phase II Site Characterization data provide adequate coverage, a frequency of detection of less than 5 percent in site datasets will be used to refine COPECs from further consideration in the BERA, as proposed in the BERA WP (EHS Support, 2018a).



SQB_{NOEC}	= Sediment quality benchmark based on NOEC aqueous toxicity data ($\mu\text{g/kg}$ dry weight sediment)
f_{oc}	= fraction of organic carbon (kg OC/kg sediment)
K_{oc}	= organic carbon-water partitioning coefficient (L/kg)
WQB_{NOEC}	= water quality benchmark based on a chronic NOEC ($\mu\text{g/L}$)

For select nonionic organic constituents, refined ESVs will be based on SQBs calculated assuming minimum f_{oc} within the exposure area and WQB_{NOEC} values based on surface water quality benchmarks derived for the general protection of aquatic life. Exposure estimates for COPECs exceeding SQBs calculated assuming minimum f_{oc} within the exposure area will be further evaluated based on sample-specific f_{oc} in the BERA exposure assessment. In the absence of sufficient data to refine sediment ESVs based on EqP approaches, the conservative minimum ESV used in the SLERA will be retained.

Refined Surface Water ESVs

Refined ESVs for surface water will be primarily based on USEPA National Recommended Water Quality Criteria (NRWQC) or MDEQ chronic surface water quality for the protection of aquatic life (**Table 3**). Chronic aquatic life surface water criteria are derived for the protection of 95 percent of aquatic species. Therefore, these criteria are considered adequately protective to identify COPEC concentrations in surface water that have the potential to result in adverse ecological effects and warrant additional evaluation in the BERA.

Inorganic COPECs

Refined surface water ESVs for metal COPECs will be based on USEPA NRWQC or MDEQ chronic surface water quality for the protection of aquatic life, where applicable. Refined surface water ESVs for metal COPECs will be applied to the sample result fraction (total versus dissolved) that corresponds to the aqueous toxicity endpoint (total versus dissolved) used as the basis for chronic aquatic life surface water criteria.

For USEPA NRWQC, chronic surface water quality criteria for many metals are based on exposure to the dissolved fraction (**Table 3**). Refined ESVs for these metals will be compared to metals concentrations in surface water samples filtered through a 0.45- μm pore size filter, which operationally defines the dissolved COPEC fraction. USEPA NRWQC for cadmium, lead, nickel, and zinc are adjusted for total hardness (as CaCO_3) using the equations provided in **Table 3**. USEPA NRWQC for copper and aluminum are based on models developed to characterize the bioavailable forms of these metals in surface water based on water quality parameters. The NRWQC for copper is based on the Biotic Ligand Model (BLM), which accounts for organic compounds and inorganic ligands in surface water that are known to complex with copper and affect bioavailability and toxicity (USEPA, 2007b). For aluminum, the refined ESV will be based on draft USEPA aquatic life ambient water quality criteria developed using multiple linear regression models to characterize aluminum bioavailability based on pH, hardness, and dissolved organic carbon (DOC; USEPA, 2017).



MDEQ Aquatic Life Standards (DEQ-7) for metals are based on the total (unfiltered) fraction, except for aluminum. MDEQ criteria for cadmium, copper, lead, nickel, and zinc will be adjusted for total hardness (as CaCO_3) using the equations provided in **Table 3**.

Refined ESVs for metals will be based on NRWQC or MDEQ criteria applicable to the sample result fraction (total versus dissolved). If the maximum EPC exceeds the applicable criterion for the corresponding fraction, the metal COPEC will be further evaluated in the BERA.

For metals that lack USEPA NRWQC or MDEQ surface water quality criteria (beryllium and manganese), refined ESVs will be based on lowest chronic values reported for all organisms (fish, daphnids, non-daphnid invertebrates, and aquatic plants) in Suter and Tsao (1996). A revised surface water ESV was not identified for barium; therefore, the minimum ESV used in the SLERA will be used as the basis for further evaluation in the BERA.

ESVs for cyanide and fluoride will be based on minimum ESVs used in the SLERA. The NRWQC criterion for cyanide is based on free cyanide analysis, which represents the concentration of the cyanide ion (CN^-) and hydrogen cyanide (HCN). The MDEQ surface water quality criterion for cyanide is based on total cyanide analysis. If the maximum EPC for free cyanide or total cyanide analyses exceed the applicable criterion, cyanide exposure in surface water will be further evaluated in the BERA.

Inorganic COPECs in surface water will also be evaluated relative to site-specific background data collected as part of the Phase II Site Characterization to further refine surface water COPECs in the BERA.

Organic COPECs

Select PAH compounds were identified as surface water COPECs based on the screening of Phase I Site Characterization and additional COPECs identified in the BERA WP based on detected constituents lacking ESVs. As indicated in **Table 3**, revised ESVs for select PAH compounds will be based on lowest chronic values reported for all organisms (fish, daphnids, non-daphnid invertebrates, and aquatic plants) in Suter and Tsao (1996). If individual PAH compounds exceed revised ESVs, further evaluation of the potential toxicity of PAH mixtures to aquatic organisms will be further evaluated in the BERA.

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Table 1
Summary of Refined Ecological Screening Values (ESVs) for Soil
Draft Technical Memorandum: Proposed Refined Ecological Screening Values
Columbia Falls Aluminum Company
Columbia Fall, Montana

Analyte	CAS Number	Minimum CFAC SLERA ESV	Refined CFAC BERA ESV	Montana State Background Investigation Mean Concentration	Plants					Soil Invertebrates					Mammals					Birds			
					USEPA Eco-SSLs	LANL EcoRisk*	ORNL	USEPA Region 5 ESLs	Refined CFAC Plant ESV	USEPA Eco-SSLs	LANL EcoRisk*	ORNL	USEPA Region 5 ESLs	Refined CFAC Invertebrate ESV	USEPA Eco-SSLs	LANL EcoRisk*	ORNL	USEPA Region 5 ESLs	Refined CFAC Mammalian ESV	USEPA Eco-SSLs	LANL EcoRisk*	ORNL	Refined CFAC Bird ESV
Metals (mg/kg)																							
Aluminum	7429905	50	See Narrative	15500	See Narrative	---	50	---	See Narrative	See Narrative	---	---	---	See Narrative	See Narrative	---	---	---	See Narrative	See Narrative	---	---	See Narrative
Antimony	7440360	0.142	0.27	0.2	---	11	5	---	11	78	78	---	---	78	0.27	2.3	0.248	0.142	0.27	---	--	---	---
Arsenic	7440382	0.25	6.8	11.4	18	18	10	---	18	---	6.8	60	---	6.8	46	19	0.25	5.7	19	43	15	2	15
Barium	7440393	1.04	110	195	---	110	500	---	110	330	330	---	---	330	2000	1800	20	1.04	1800	---	720	17.2	720
Beryllium	7440417	1.06	2.5	0.7	---	2.5	10	---	2.5	40	40	---	---	40	21	35	2.42	1.06	21	---	--	---	---
Cadmium	7440439	0.00222	0.27	0.3	32	32	4	---	32	140	140	20	---	140	0.36	0.27	3.533	0.00222	0.27	0.77	0.29	1.2	0.29
Chromium (trivalent)	7440473	0.35	23	19.6	---	---	---	---	---	---	---	---	---	---	34	63	10026	---	34	26	23	0.83	23
Chromium (hexavalent)	7440473	NE	0.34	---	---	0.35	1	---	0.35	---	0.34	0.4	0.4	0.34	130	510	112.01	---	130	---	140	---	140
Cobalt	7440484	0.14	13	7.3	13	13	20	---	13	---	---	---	---	---	230	240	---	0.14	230	120	76	---	76
Copper	7440508	5.4	14	17.6	70	70	100	---	70	80	80	50	---	80	49	42	55.7	5.4	42	28	14	38.9	14
Iron	7439896	No ESV	See Narrative	18200	See Narrative	---	---	---	See Narrative	See Narrative	---	---	---	See Narrative	See Narrative	---	---	---	See Narrative	See Narrative	---	---	See Narrative
Lead	7439921	0.0537	11	15.3	120	120	50	---	120	1700	1700	500	---	1700	56	93	29.3	0.0537	56	11	11	0.94	11
Manganese	7439965	220	220	508	220	220	500	---	220	450	450	---	---	450	4000	1400	322	---	1400	4300	1300	825	1300
Mercury	7439976	0.005	0.013	0.05	---	34	0.3	---	34	---	0.05	0.1	0.1	0.05	---	1.7	4.76	---	1.7	---	0.013	0.37	0.013
Nickel	7440020	9.7	10	16.6	38	38	30	---	38	280	280	200	---	280	130	10	146.52	13.6	10	210	20	64.08	20
Selenium	7782492	0.0276	0.52	0.4	0.52	0.52	1	---	0.52	4.1	4.1	70	---	4.1	0.63	0.7	0.733	0.0276	0.63	1.2	0.71	0.331	0.71
Thallium	7440280	0.027	0.05	0.25	---	0.05	1	---	0.05	---	---	---	---	---	---	0.42	0.027	0.0569	0.42	---	4.5	---	4.5
Vanadium	7440622	0.714	4.7	30.9	---	60	2	---	60	---	---	---	---	---	280	290	0.714	1.59	280	7.8	4.7	9.439	4.7
Zinc	7440666	6.62	46	60.5	160	160	50	---	160	120	120	200	6.62	120	79	99	586.1	---	79	46	47	12	46
Essential Nutrients (mg/kg)																							
Calcium	7440702	No ESV	Background	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Magnesium	7439954	No ESV	Background	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Potassium	7440097	No ESV	Background	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sodium	7440235	No ESV	Background	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Other Inorganic Parameters (mg/kg)																							
Cyanide, Total	57125	0.1	0.098	---	---	---	---	---	---	---	---	---	---	---	---	330	---	1.33	330	---	0.098	---	0.098
Fluoride	16984488	6.5	120	---	---	---	---	---	---	---	---	---	---	---	---	1100	149.4	---	1100	---	120	6.5	120
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)																							
Total LMW PAHs	NA	29	29	---	---	---	---	---	---	29	---	---	---	29	100	---	---	---	100	---	---	---	---
Total HMW PAHs	NA	1.1	1.1	---	---	---	---	---	---	18	---	---	---	18	1.1	---	---	---	1.1	---	---	---	---
Semi-Volatile Organic Compounds (SVOCs) - Non PAH (mg/kg)																							
1,2,4,5-Tetrachlorobenzene	95943	2.02	2.02	---	---	---	---	---	---	---	---	---	---	---	--	---	2.02	2.02	---	---	---	---	
1,4-Dioxane	123911	1.83	1.83	---	---	---	---	---	---	---	---	---	---	---	--	1.83	2.05	1.83	---	---	---	---	
2,4,5-Trichlorophenol	95954	4	4	---	---	---	4	---	4	---	---	9	---	9	---	--	---	14.1	14.1	---	---	---	---
2,4-Dimethylphenol	105679	0.01	0.01	---	---	---	---	0.01	0.01	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2,4-Dinitrophenol	51285	0.0609	0.0609	---	---	---	20	---	20	---	---	---	---	---	---	--	---	0.0609	0.0609	---	---	---	---
2,4-Dinitrotoluene	121142	1.28	6	---	---	6	---	---	6	---	18	---	---	18	---	14	---	1.28	14	---	---	---	---
2,6-Dinitrotoluene	606202	0.0328	4	---	---	---	---	---	---	---	30	---	---	30	---	4	---	0.0328	4	---	52	---	52
2-Chloronaphthalene	91587	0.0122	0.0122	---	---	---	---	---	---	---	---	---	---	---	---	--	---	0.0122	0.0122	---	---	---	---
2-Chlorophenol	95578	0.243	0.39	---	---	---	---	---	---	---	---	---	---	---	---	0.54	---	0.243	0.54	---	0.39	---	0.39
2-Methylphenol	95487	0.67	0.67	---	---	0.67	---	---	0.67	---	---	---	---	---	---	580	---	---	580	---	---	---	---
2-Nitrophenol	88755	1.6	1.6	---	---	---	---	---	---	---	---	---	---	---	---	--	---	1.6	1.6	---	---	---	---
3,3'-Dichlorobenzidine	91941	0.646	0.646	---	---	---	---	---	---	---	---	---	---	---	---	--	---	0.646	0.646	---	---	---	---
4,6-Dinitro-2-methylphenol	534521	0.144	0.144	---	---	---	---	---	---	---	---	---	---	---	---	--	---	0.144	0.144	---	---	---	---
4-Chloroaniline	106478	1	1	---	---	1	---	---	1	---	1.8	---	---	1.8	---	--	---	---	---	---	---	---	---
4-Nitrophenol	100027	No ESV	7	---	---	---	---	---	---	---	---	7	---	7	---	--	---	---	---	---	---	---	---
Bis(2-chloroethoxy) methane	111911	0.302	0.302	---	---	---	---	---	---	---	---	---	---	---	---	--	---	0.302	0.302	---	---	---	---
Bis(2-ethylhexyl) phthalate	117817	0.02	0.02	---	---	---	---	---	---	---	---	---	---	---	---	0.6	36	0.925	0.6	---	0.02	0.91	0.02
Butylbenzylphthalate	85687	0.239	0.239	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Caprolactam	105602	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Dibenzofuran	132649	6.1	6.1	---	---	6.1	---	---	6.1	---	---	---	---	---	---	--	---	---	---	---	---	---	---
Di-n-butylphthalate	84742	0.011	0.011	---	---	160	200	---	160	---	---	---	---	---	---	180	1090	---	180	---	0.011	0.09	0.011
Di-n-octylphthalate	117840	0.91	0.91	---	---	---	---	---	---	---	---	---	---	---	---	0.91	---	---	0.91	---	---	---	---
Hexachlorobenzene	118741	0.079	0.079	---	---	10	---	---	10	---	10	---	---	10	---	0.2	---	0.199	0.2	---	0.079	---	0.079
Hexachlorobutadiene	87683	0.0398	0.0398	---	---	---	---	---	---	---	---	---	---	---	---	--	---	0.0398	0.0398	---	---	---	---

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Analyte	CAS Number	Minimum CFAC SLERA ESV	Refined CFAC BERA ESV	Montana State Background Investigation Mean Concentration	Plants					Soil Invertebrates					Mammals					Birds			
					USEPA Eco-SSLs	LANL EcoRisk*	ORNL	USEPA Region 5 ESLs	Refined CFAC Plant ESV	USEPA Eco-SSLs	LANL EcoRisk*	ORNL	USEPA Region 5 ESLs	Refined CFAC Invertebrate ESV	USEPA Eco-SSLs	LANL EcoRisk*	ORNL	USEPA Region 5 ESLs	Refined CFAC Mammalian ESV	USEPA Eco-SSLs	LANL EcoRisk*	ORNL	Refined CFAC Bird ESV
Hexachlorocyclopentadiene	77474	0.755	0.755	---	---	---	10	---	10	---	---	---	---	---	---	---	---	0.755	0.755	---	---	---	---
Hexachloroethane	67721	0.596	0.596	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.596	0.596	---	---	---	---
Nitrobenzene	98953	1.31	2.2	---	---	---	---	---	---	---	2.2	40	---	2.2	---	4.8	---	1.31	4.8	---	---	---	---
N-Nitrosodi-n-propylamine	621647	0.544	0.544	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.544	0.544	---	---	---	---
N-Nitrosodiphenylamine	86306	0.545	0.545	---	---	---	---	---	---	---	---	20	---	20	---	---	---	0.545	0.545	---	---	---	---
Pentachlorophenol	87865	0.119	0.36	---	5	5	3	---	5	31	31	6	---	31	2.8	0.81	0.879	0.119	0.81	2.1	0.36	---	0.36
Phenol	108952	0.79	0.79	---	---	0.79	70	---	0.79	---	1.8	30	---	1.8	---	37	---	120	37	---	---	---	---
Volatile Organic Compounds (VOCs) (mg/kg)																							
Bromomethane	74839	0.235	0.235	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.235	---	---	---	---	---
Cyclohexane	110827	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Isopropylbenzene	98828	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methyl acetate	79209	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methylcyclohexane	108872	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
M,P-Xylene	179601231	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
O-Xylene	95476	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total Xylenes	1330207	No ESV	1.4	---	---	100	---	10	100	---	---	---	---	---	---	1.4	4.162	---	1.4	---	41	---	41
Dioxin and Dioxin-Like Compounds (mg/kg)																							
Mammalian TEC _{2,3,7,8-TCDD}	NA	NE	0.00000029	---	---	---	---	---	---	---	5	---	---	5	---	0.00000029	3.15E-07	---	0.00000029	---	---	---	---
Avian TEC _{2,3,7,8-TCDD}	NA	NE	0.00000158	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00000158	0.00000158	---
Polychlorinated Biphenyls (mg/kg)																							
Aroclor-1016	12674-11-2	1.1	1.1	---	---	---	---	---	---	---	---	---	---	---	---	1.1	6.52	---	1.1	---	---	---	---
Aroclor-1221	11104-28-2	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor-1232	11141-16-5	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor-1242	53469-21-9	0.041	0.041	---	---	---	---	---	---	---	---	---	---	---	---	0.39	0.329	---	0.39	---	0.041	0.339	0.041
Aroclor-1248	12672-29-6	0.0073	0.0073	---	---	---	---	---	---	---	---	---	---	---	---	0.0073	0.071	---	0.0073	---	0.041	---	0.041
Aroclor-1254	11097-69-1	0.041	0.041	---	---	160	---	---	160	---	---	---	---	---	---	0.45	0.111	---	0.45	---	0.041	0.149	0.041
Aroclor-1260	11096-82-5	0.88	0.88	---	---	---	---	---	---	---	---	---	---	---	---	10	---	---	10	---	0.88	---	0.88
Aroclor-1262	37324-23-5	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Aroclor-1268	11100-14-4	No ESV	No ESV	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total PCB Aroclors	1336-36-3	0.000332	0.000332	---	---	---	40	---	40	---	---	---	---	---	---	---	---	0.000332	0.000332	---	---	---	---

Notes:
No ESV, An ecological screening value was not identified from the listed sources. BERA, Baseline Ecological Risk Assessment
CFAC, Columbia Falls Aluminum Company
Eco-SSL, Ecological Soil Screening Level
ESL, Ecological Screening Level
ESV, Ecological Screening Value
HMW, High Molecular Weight
LANL, Los Alamos National Laboratory
LMW, Low Molecular Weight
NA, Not applicable.
NE, Not evaluated.
ORNL, Oak Ridge National Laboratory Benchmarks
PAH, Polycyclic Aromatic Hydrocarbons
SLERA, Screening-Level Ecological Risk Assessment
TEC_{2,3,7,8-TCDD}, Toxicity equivalency concentration - 2,3,7,8-TCDD
USEPA, United States Environmental Protection Agency
, An asterisk () indicates that the values identified in LANL are geometric mean no-effect benchmarks for particular receptor groups.

Table 2
Summary of Refined Ecological Screening Values (ESVs) for Sediment
Draft Technical Memorandum: Proposed Refined Ecological Screening Values
Columbia Falls Aluminum Company
Columbia Fall, Montana

Analyte	CAS Number	log K _{ow}	Minimum CFAC SLERA ESV	Refined CFAC BERA ESV	Threshold Effects Ecological Screening Values					
					Consensus-based Threshold Effect Concentration (TEC) (MacDonald et al., 2000)	USEPA Region 5 RCRA Ecological Screening Levels	USEPA Region 3 BTAG Freshwater Sediment Screening Benchmarks	TEL-HA28 (USEPA, 1996; Ingersoll et al., 1996)	USEPA ESBs PAHs (USEPA, 2003d) Coc, PAHi,FCVi (mg/kg @ 1% TOC)	USEPA ESBs Nonpolar Organics (USEPA, 2008c) (mg/kg @ 1% TOC)
Metals (mg/kg)										
Aluminum	7429905	NA	26000	26000	--	--	--	26000	--	--
Antimony	7440360	NA	2	2	--	--	2	--	--	--
Arsenic	7440382	NA	9.79	9.79	9.79	9.79	9.8	10.787	--	--
Barium	7440393	NA	No ESV	No ESV	--	--	--	--	--	--
Beryllium	7440417	NA	No ESV	No ESV	--	--	--	--	--	--
Cadmium	7440439	NA	0.583	0.99	0.99	0.99	0.99	0.583	--	--
Chromium	7440473	NA	36.2	43.4	43.4	43.4	43.4	36.2	--	--
Cobalt	7440484	NA	50	50	--	50	50	--	--	--
Copper	7440508	NA	28	31.6	31.6	31.6	31.6	28	--	--
Iron	7439896	NA	20000	20000	--	--	20000	188400	--	--
Lead	7439921	NA	35.8	35.8	35.8	35.8	35.8	37.2	--	--
Manganese	7439965	NA	460	460	--	--	460	631	--	--
Mercury	7439976	NA	0.174	0.18	0.18	0.174	0.18	--	--	--
Nickel	7440020	NA	19.5	22.7	22.7	22.7	22.7	19.5	--	--
Selenium	7782492	NA	2	2	--	--	2	--	--	--
Silver	7440224	NA	0.5	1	--	0.5	1	--	--	--
Thallium	7440280	NA	No ESV	No ESV	--	--	--	--	--	--
Vanadium	7440622	NA	No ESV	No ESV	--	--	--	--	--	--
Zinc	7440666	NA	98	121	121	121	121	98	--	--
Essential Nutrients (mg/kg)										
Calcium	7440702	NA	No ESV	Background	--	--	--	--	--	--
Magnesium	7439954	NA	No ESV	Background	--	--	--	--	--	--
Potassium	7440097	NA	No ESV	Background	--	--	--	--	--	--
Sodium	7440235	NA	No ESV	Background	--	--	--	--	--	--
Other Inorganic Parameters (mg/kg)										
Cyanide, Total	57125	NA	0.0001	0.1	--	0.0001	0.1	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)										
2-Methylnaphthalene	91576	3.72	0.0202	Equilibrium Partitioning Sediment Benchmark (ΣESBTU _{FCV,Total}) approach based on sample-specific organic carbon content (USEPA, 2003d; see text)	--	0.0202	0.0202	--	4.47	--
Acenaphthene	83329	4.01	0.00671		--	0.00671	0.00671	--	4.91	--
Acenaphthylene	208968	3.22	0.00587		--	0.00587	0.0059	--	4.52	--
Anthracene	120127	4.53	0.01		0.0572	0.0572	0.0572	0.01	5.94	--
Fluorene	86737	4.21	0.01		0.0774	0.0774	0.0774	0.01	5.38	--
Naphthalene	91203	3.36	0.015		0.176	0.176	0.176	0.015	3.85	--
Phenanthrene	85018	4.57	0.019		0.204	0.204	0.204	0.019	5.96	--
Total LMW PAHs	NA	NA	0.076		--	--	0.076	0.076	--	--
Benzo(a) pyrene	50328	6.11	0.032		0.15	0.15	0.15	0.032	9.65	--

Table 2
Summary of Refined Ecological Screening Values (ESVs) for Sediment
Draft Technical Memorandum: Proposed Refined Ecological Screening Values
Columbia Falls Aluminum Company
Columbia Fall, Montana

Analyte	CAS Number	log K _{ow}	Minimum CFAC SLERA ESV	Refined CFAC BERA ESV	Threshold Effects Ecological Screening Values					
					Consensus-based Threshold Effect Concentration (TEC) (MacDonald et al., 2000)	USEPA Region 5 RCRA Ecological Screening Levels	USEPA Region 3 BTAG Freshwater Sediment Screening Benchmarks	TEL-HA28 (USEPA, 1996; Ingersoll et al., 1996)	USEPA ESBs PAHs (USEPA, 2003d) Coc, PAHi,FCVi (mg/kg @ 1% TOC)	USEPA ESBs Nonpolar Organics (USEPA, 2008c) (mg/kg @ 1% TOC)
Benzo(a)anthracene	56553	6.71	0.016	Equilibrium Partitioning Sediment Benchmark (ΣESBTU _{FCV,Total}) approach based on sample-specific organic carbon content (USEPA, 2003d; see text)	0.108	0.108	0.108	0.016	8.41	--
Benzo(b) fluoranthene	205992	6.27	10.4		--	10.4	--	--	9.79	--
Benzo(g,h,i) perylene	191242	6.51	0.016		--	0.17	0.17	0.016	10.95	--
Benzo(k) fluoranthene	207089	6.29	0.24		--	0.24	0.24	--	9.81	--
Chrysene	218019	5.71	0.027		0.166	0.166	0.166	0.027	8.44	--
Dibenzo(a,h) anthracene	53703	6.71	0.01		0.033	0.033	0.033	0.01	11.23	--
Indeno(1,2,3,-cd) pyrene	193395	6.72	0.017		--	0.2	0.017	0.017	11.15	--
Fluoranthene	206440	5.08	0.031		0.423	0.423	0.423	0.031	7.07	--
Pyrene	129000	4.92	0.044		0.195	0.195	0.195	0.044	6.97	--
Total HMW PAHs	NA	NA	0.19		--	--	0.19	0.19	--	--
Total PAHs	NA	NA	0.26	1.61	--	1.61	0.26	--	--	
Semi-Volatile Organic Compounds (SVOCs) - Non PAH (mg/kg)										
Acetophenone	98862	1.67	No ESV	No ESV	--	--	--	--	--	--
Benzaldehyde	100527	1.71	No ESV	No ESV	--	--	--	--	--	--
Bis(2-chloroethyl) ether	111444	1.56	No ESV	No ESV	--	--	--	--	--	--
Carbazole	86748	3.29	No ESV	No ESV	--	--	--	--	--	--
Dibenzofuran	132649	3.71	0.300736	17 @ 1 % OC	--	0.449	0.415	--	--	17
Methylphenol, 3 & 4	106445	2.06	No ESV	0.67	--	0.0202	0.67	--	--	--

Notes:

No ESV, An ecological screening value was not identified from the listed sources.
ΣESBTU_{FCV,Total}, Equilibrium-Partitioning Sediment Benchmark Toxic Units based on final chronic values (FCVs)
BERA, Baseline Ecological Risk Assessment
BTAG, Biological Technical Assistance Group
CFAC, Columbia Falls Aluminum Company
ESB, Equilibrium Partitioning Sediment Benchmark
ESV, Ecological Screening Value
HMW, High Molecular Weight
LMW, Low Molecular Weight
NA, Not applicable.
NE, Not evaluated.
OC, Organic carbon
PAH, Polycyclic Aromatic Hydrocarbons
RCRA, Resource Conservation and Recovery Act
SLERA, Screening-Level Ecological Risk Assessment
TEC, Threshold Effect Concentration
TEL-HA28, Threshold effect level - *Hyalella azteca* 28-day test
TOC, Total organic carbon

Table 3
Summary of Refined Ecological Screening Values (ESVs) for Surface Water
Draft Technical Memorandum: Proposed Refined Ecological Screening Values
Columbia Falls Aluminum Company
Columbia Fall, Montana

Analyte	CAS Number	Fraction	Minimum CFAC SLERA ESV	Refined CFAC BERA ESV	Refined ESV Basis	DEQ-7 Aquatic Life Standard	USEPA National Recommended Water Quality Criteria	USEPA Region 3 Freshwater Screening Benchmark	Toxicological Benchmarks for Screening		Canadian Water Quality Guidelines (CCME)
									Lowest Chronic Value - All Organisms	Tier II Secondary Chronic Values	
Metals (µg/L)											
Aluminum	7429905	D	87	87 (pH 6.5-9)	DEQ-7	87 (pH 6.5-9)	--	87	460	--	--
		T	87	2017 Draft Freshwater Chronic Criteria	USEPA (2017)	--	87 (pH 6.5-9)	--	--	--	--
Barium	7440393	D	4	4	Suter and Tsao (1996)	--	--	4	--	4	--
		T	4	--	--	--	--	--	--	--	--
Beryllium	7440417	D	0.66	5.3	Suter and Tsao (1996)	--	--	0.66	5.3	0.66	--
		T	0.66	--	--	--	--	--	--	--	--
Cadmium	7440439	D	0.09	0.09 (h)	NRWQC	--	0.25 (h)	0.09 (h)	0.15	--	0.09
		T	0.09	0.25 (h)	DEQ-7	0.25 (h)	--	--	--	--	--
Copper	7440508	D	0.23	USEPA Biotic Ligand Model (BLM)	USEPA (2007)	--	Biotic Ligand Model (BLM)	2.74 (h)	0.23	--	--
		T	0.23	2.85 (h)	DEQ-7	2.85 (h)	--	--	--	--	--
Iron	7439896	D	158	--	--	--	--	300	158	--	300
		T	158	1000	NRWQC/DEQ-7	1000	1000	--	--	--	--
Lead	7439921	D	0.54	0.54 (h)	NRWQC	--	0.54 (h)	0.54 (h)	12.26	--	--
		T	0.545	0.545 (h)	DEQ-7	0.545 (h)	--	--	--	--	--
Manganese	7439965	D	120	1100	Suter and Tsao (1996)	--	--	120	1100	120	--
		T	120	--	--	--	--	--	--	--	--
Nickel	7440020	D	5	16.1 (h)	NRWQC	--	16.1 (h)	16.1 (h)	5	--	--
		T	5	16.1 (h)	DEQ-7	16.1 (h)	--	--	--	--	--
Zinc	7440666	D	30	36.5 (h)	NRWQC	--	36.5 (h)	36.5 (h)	30	--	30
		T	30	37 (h)	DEQ-7	37 (h)	--	--	--	--	--
Other Inorganic Parameters (µg/L)											
Cyanide, Total	57125	T	5.2	5.2	DEQ-7	5.2	--	--	7.8	--	5
Cyanide, Free	STL02227	T	5.2	5.2	NRWQC	--	5.2	5		--	--
Fluoride	16984488	T	120	120	CCME	--	--	602.7 (h)	--	--	120

Table 3
Summary of Refined Ecological Screening Values (ESVs) for Surface Water
Draft Technical Memorandum: Proposed Refined Ecological Screening Values
Columbia Falls Aluminum Company
Columbia Fall, Montana

Analyte	CAS Number	Fraction	Minimum CFAC SLERA ESV	Refined CFAC BERA ESV	Refined ESV Basis	DEQ-7 Aquatic Life Standard	USEPA National Recommended Water Quality Criteria	USEPA Region 3 Freshwater Screening Benchmark	Toxicological Benchmarks for Screening		Canadian Water Quality Guidelines (CCME)
									Lowest Chronic Value - All Organisms	Tier II Secondary Chronic Values	
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)											
Benzo(a) pyrene	50328	T	0.014	0.3	Suter and Tsao (1996)	--	--	0.015	0.3	0.014	0.015
Benzo(a)anthracene	56553	T	0.018	0.65	Suter and Tsao (1996)	--	--	0.018	0.65	0.027	0.018
Benzo(b) fluoranthene	205992	T	No ESV	No ESV	--	--	--	--	--	--	--
Benzo(g,h,i) perylene	191242	T	No ESV	No ESV	--	--	--	--	--	--	--
Chrysene	218019	T	No ESV	No ESV	--	--	--	--	--	--	--
Fluoranthene	206440	T	0.04	15	Suter and Tsao (1996)	--	--	0.04	15	--	0.04
Indeno(1,2,3,-cd) pyrene	193395	T	No ESV	No ESV	--	--	--	--	--	--	--
Phenanthrene	85018	T	0.4	200	Suter and Tsao (1996)	--	--	0.4	200	--	0.4
Pyrene	129000	T	0.025	0.025	--	--	--	0.025	--	--	0.025

Notes:

No ESV, An ecological screening value was not identified from the listed sources.

D, Dissolved (filtered) fraction

T, Total (unfiltered) fraction

--, No value available.

(d), Criterion based on dissolved fraction.

(h), Hardness-dependent criterion estimated at a total hardness values of 25 mg/L as CaCO₃ based on the following equations:

Metal	MDEQ		NRWQC			EPA R3		
	exp.{mc[ln(hardness)]+bc}		exp{mC [ln(hardness)]+ bC} (CF)			exp{mC [ln(hardness)]+ bC} (CF)		
	mc	bc	mc	bc	CF	mc	bc	CF
Cadmium	0.7977	-3.909	0.7977	-3.909	1.101672-[(lnhardness)(0.041838)]	0.7977	-3.909	1.101672-[(lnhardness)(0.041838)]
Copper	0.8545	-1.702	Biotic Ligand Model					
Fluoride						0.907	7.3940	0.02
Lead	1.273	-4.705	1.273	-4.705	1.46203-[(lnhardness)(0.145712)]	1.273	-4.705	1.46203-[(lnhardness)(0.145712)]
Nickel	0.846	0.0584	0.846	0.0584	0.997	0.846	0.0584	0.997
Zinc	0.8473	0.884	0.8473	0.884	0.986	0.8473	0.884	0.986

BERA, Baseline Ecological Risk Assessment

BLM, Biotic ligand model.

CCME, Canadian Council of Ministers of the Environment

CFAC, Columbia Falls Aluminum Company

DEQ-7, Montana Department of Environmental Quality Circular DEQ-7 Montana Numeric Water Quality Standards

ESV, Ecological Screening Value

NRWQC, National Recommended Water Quality Criteria

SLERA, Screening-Level Ecological Risk Assessment

USEPA, United States Environmental Protection Agency



Appendix A2 Technical Memorandum: Proposed Wildlife Exposure Modeling Approach to Support the Baseline Ecological Risk at the Columbia Falls Superfund Site

Date: February 21, 2019

To: Mike Cirian, USEPA

From: Laura Jensen, Roux

CC: John Stroiazzo, Glencore
Steve Wright, CFAC
Dick Sloan, MDEQ
Andrew Baris, Roux
Michael Ritorto, Roux
Gary Long, EHS Support, LLC

Subject: **Technical Memorandum: Proposed Wildlife Exposure Modeling Approach to Support the Baseline Ecological Risk Assessment at the Columbia Falls Superfund Site
Former Columbia Falls Aluminum Company Aluminum Reduction Facility
Columbia Falls, Montana**

On behalf of Columbia Falls Aluminum Company, LLC (CFAC), Roux Environmental Engineering and Geology, D.P.C. (Roux) and EHS Support, LLC prepared the attached Technical Memorandum for Proposed Wildlife Exposure Modeling Approach to Support the Baseline Ecological Risk Assessment (BERA) for the CFAC Superfund Site in Columbia Falls, Montana. This memorandum has been prepared as part of the ongoing Remedial Investigation/Feasibility Study (RI/FS) being conducted pursuant to the Administrative Settlement Agreement and Order on Consent (AOC) dated November 30, 2015 between CFAC and the United States Environmental Protection Agency (USEPA) (CERCLA Docket No. 08-2016-0002).

Should there be any questions or comments on this submission, please do not hesitate to contact me at (631) 230-2300.

Sincerely,


Laura Jensen, P.G. (NY)
Senior Hydrogeologist

MEMO

To: Andrew Baris, Roux

From: Gary Long

CC: Michael Ritorto, Roux
Laura Jensen, Roux
Tom Biksey, EHS Support

Date: February 21, 2019

Re: *Technical Memorandum: Proposed Wildlife Exposure Modeling Approach to Support the Baseline Ecological Risk Assessment at the Columbia Falls Superfund Site*
Former Columbia Falls Aluminum Company Aluminum Reduction Facility
Columbia Falls, Montana

Introduction

This technical memorandum describes the approach for estimating dietary exposure to terrestrial and semi-aquatic wildlife in the Baseline Ecological Risk Assessment (BERA) for the Columbia Falls Aluminum Company (CFAC) Superfund Site in Columbia Falls, Montana. The technical memorandum was prepared as an interim deliverable to supplement the general risk assessment framework provided in the *Baseline Ecological Risk Assessment Work Plan* (BERA WP) submitted to the United States Environmental Protection Agency (USEPA) and Montana Department of Environmental Quality (MDEQ) in November 2017 and revised in May 2018 (EHS Support, 2018).

The technical memorandum presents the modeling approach, preliminary exposure parameters, bioaccumulation relationships, and toxicity reference values (TRVs) that are proposed to evaluate dietary pathways to terrestrial and semi-aquatic wildlife receptors that may be exposed to bioaccumulative constituents of potential ecological concern (COPECs) at the Site. Bioaccumulation relationships and TRVs are proposed for potentially bioaccumulative COPECs identified in the *Screening Level Ecological Risk Assessment* (SLERA) conducted based on Phase I Site Characterization data (Roux Associates, 2017). Further identification of potentially bioaccumulative COPECs will be conducted based on a re-screening of the Phase I Site Characterization data with additional data being collected in accordance with the Phase II Site Characterization Sampling and Analysis Plan (Roux Associates, 2018). In addition, further evaluation of the appropriateness of exposure assumptions and model parameters presented in this technical memorandum may be warranted in the BERA to reduce uncertainty in dietary exposure estimates used to characterize risk to wildlife through dietary pathways. The BERA Report will include an appendix that provides documentation and justification for the exposure parameters and model assumptions used in dietary exposure models for the Site.



The following sections describe the identification of preliminary bioaccumulative COPECs to evaluate via dietary exposure pathways, the dietary exposure modeling approach and parameters, and the preliminary selection of wildlife TRVs.

Identification of Bioaccumulative COPECs

COPECs identified in the SLERA and BERA WP based on the preliminary analysis of Phase I Site Characterization data (Roux Associates, 2017) were evaluated to identify potentially bioaccumulative constituents for dietary exposure modeling in the BERA. COPECs were conservatively identified in the SLERA based on comparisons of maximum concentrations in the Phase I Site Characterization datasets to minimum ecological screening values (ESVs). In addition, the BERA WP identified additional COPECs based on detected constituents lacking ESVs. COPECs with the potential to bioaccumulate were identified for dietary exposure modeling in the BERA based on satisfaction of one or more of the following criteria:

1. Constituents identified as Persistent, Bioaccumulative, and Toxic Constituents as part of the USEPA Toxics Release Inventory (TRI) Program
2. Constituents identified as important bioaccumulative constituents in USEPA (2000)
3. Organic constituents with a log octanol-water partitioning coefficient ($\log K_{ow}$) greater than 3.5 based on USEPA (2000)
4. Constituents with USEPA Ecological Soil Screening Levels (Eco-SSLs) derived for birds or mammals (USEPA, 2005a).

Table 1 presents a preliminary list of COPECs that will be included in dietary exposure modeling in the BERA based on the above criteria. The preliminary list of bioaccumulative COPECs presented in Table 1 will be re-evaluated based on the combined results of the Phase I and Phase II Site Characterization sampling. As indicated in the BERA WP, relevant exposure data from the Phase I and Phase II Site Characterization datasets will be re-screened to identify COPECs based on conservative comparisons of maximum concentrations to minimum ESVs. COPECs identified in the re-screening of the combined Phase I and Phase II datasets that have the potential to bioaccumulate based on one or more of the above criteria will be included in the dietary dose modeling presented in the BERA. Dietary exposure to these potentially bioaccumulative COPECs will be evaluated in a manner consistent with the approach described in this technical memorandum.

Dietary Exposure Modeling

The evaluation of potential exposure via direct and incidental ingestion pathways will be conducted based on a tiered approach in accordance with the USEPA guidance for conducting probabilistic ecological risk assessment (USEPA, 2001). The tiered approach will include the following ingestion models to quantitatively assess potential risks to representative wildlife receptors:

- Deterministic exposure modeling: Based on conventional single point estimates of exposure point concentrations (EPCs) and typical exposure parameters. Deterministic exposure models will be developed based using a tiered approach that incorporates preliminary and refined exposure estimates:
 - Preliminary exposure estimates: Screening-level exposure assumptions based on maximum EPCs and conservative exposure assumptions.



- Refined exposure estimates: Refined exposure estimates using EPCs based on conservative estimates of the mean concentrations at the site, assuming random foraging throughout each exposure area and more realistic exposure assumptions. Further discussion of the assumptions supporting the preliminary and refined exposure estimates are provided in relevant sections within this technical memorandum.
- Probabilistic exposure modeling: If estimated doses based on refined deterministic modeling exceed doses associated with lowest-observed-adverse-effect levels (LOAELs), probabilistic models may be developed to estimate exposure based on the distributions of EPCs and exposure parameters to account for variability and/or uncertainty in model parameters.

The following sections describe the basic model structure, receptor-specific exposure factors, exposure variables, bioaccumulation relationships, and area use factors that will be used for dietary exposure modeling in the BERA.

Model Structure

The underlying algorithm of the dietary exposure model is the same for deterministic and probabilistic approaches. However, deterministic estimates use single, discrete values for model parameters (i.e., representative of a typical or a worst case), whereas probabilistic estimates use a distribution of values for model parameters to account for the inherent variability and/or uncertainty in the estimation of those parameters. Procedures for calculating probabilistic exposure estimates are consistent with USEPA (2001) guidance on probabilistic ecological risk assessments and USEPA (1997) guidance on Monte Carlo analyses. The following sections describe the model structure and the general procedures for deterministic and probabilistic modeling.

Deterministic Modeling Procedures

Deterministic exposure estimates will be based on comparisons of receptor-specific estimated daily doses (EDDs) calculated from simple dose rate models to TRVs. Dietary exposure estimates consider receptor-specific exposure factors, including typical dietary composition, and exposure variables that represent site-specific measurements of COPEC concentrations in exposure media. The general form of the dose rate model used to calculate EDDs is:

$$EDD = \frac{1}{BW} \sum_{i=1}^N (FIR_{dw} \times \sum_{j=1}^M (f_j \times C_j) + SIR_{dw} \times C_{sub} + WIR \times C_{sw})_i \times AUF_i \quad (1)$$

where:

- N = Number of exposure areas within the typical receptor home range
- M = Receptor-specific dietary items
- BW = Receptor-specific body weight (kg)
- FIR_{dw} = Receptor-specific daily food ingestion rate (kg/day, dry weight)
- f_j = Proportion of dietary item j to total dietary composition
- C_j = COPEC concentration in dietary item j (mg/kg tissue dry weight)
- SIR_{dw} = Receptor-specific incidental substrate ingestion rate (kg/day, dry weight)
- C_{sub} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- WIR = Receptor-specific daily drinking-water ingestion rate (Liters (L)/day)
- C_{sw} = COPEC concentration in unfiltered surface water (mg COPEC/L)



AUF_i = Area use factor for a given exposure area and receptor

For receptors with foraging ranges that are smaller than a given exposure area, the EDD will be calculated based on EPCs derived from data collected within that exposure area. If the foraging range of a receptor is greater than an exposure area, the EDD will be calculated as the sum of area use factor (AUF)-weighted doses obtained from the exposure areas within the typical home range of the receptor. Further explanation regarding the calculation of AUFs is presented in the *Area Use Factors* section of this technical memorandum.

As stated in the BERA WP, dietary exposure to small home range receptors will also be evaluated based on point-by-point comparisons of measured COPEC concentrations in biologically relevant sampling intervals to estimated soil or sediment benchmark concentrations that are back-calculated from TRVs. Consistent with the approach used to calculate USEPA Eco-SSL values (USEPA, 2005a), the general exposure model presented in Equation 1 will be used to back-calculate soil or sediment benchmarks for each representative small home range receptor by setting the EDD equivalent to the TRV and solving for the C_{sub} value.

A modified version of the dietary exposure model presented in Equation 1 will be used to evaluate the potential additive exposure to dioxin/furan compounds in surface soil sampled within the Main Plant Area and adjacent areas. Additive exposure to dioxin/furan compounds will be evaluated using the toxicity equivalence methodology consistent with USEPA (2008a). The modified dietary exposure model will calculate an EDD for the 17 individual dioxin/furan compounds in each sample based on the general model presented above. The EDD for each compound will be multiplied by the compound-specific toxicity equivalence factor (TEF) for birds or mammals relative to the toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) to estimate the toxicity equivalence concentration (TEC) for each compound (Van den Berg et al., 2006; Van den Berg et al., 1998; USEPA, 2008a). TECs of the 17 dioxin/furan compounds will be summed to calculate an overall TEC:

$$TEC = \sum_{n=1}^k EDD_n \times TEF_n \quad (2)$$

where:

TEC = Toxicity equivalence concentration

EDD_n = Estimated daily dose calculated for dioxin-like chemical n

TEF_n = Toxicity equivalence factor for dioxin-like chemical n

k = Number of toxic dioxin-like chemicals in the mixture

The TEC will be evaluated relative to dietary TRVs for 2,3,7,8-TCDD derived for birds and mammals.

Probabilistic Modeling Procedures

Procedures for calculating probabilistic exposure estimates will be consistent with USEPA (2001) guidance on probabilistic ecological risk assessments and USEPA (1997) guidance on Monte Carlo analyses. As warranted based on the outcome of deterministic exposure estimates, Monte Carlo simulations may be conducted using the statistical computing and graphics language R (R Core Team, 2013) to estimate the EDD and the average estimated daily dose (AEDD) distributions for each receptor based on the following procedures.



To estimate the EDD distribution for a receptor:

1. R will be used to randomly select a body weight (BW) from its literature-derived distribution and to calculate the corresponding food ingestion rate (dry weight) (FIR_{dw}), incidental substrate ingestion rate (dry weight) (SIR_{dw}), and drinking water ingestion rate (WIR).
2. f_i will be selected based on dietary composition.
3. C_i and C_{sub} will be randomly selected from their corresponding distributions from site-specific concentrations measured during the Phase I and Phase II Site Characterization sampling.
4. EDD will be calculated using Equation (1) above.
5. Steps #1 to #4 will be repeated a pre-set number of times to estimate the EDD distribution; the number of iterations will be pre-set at 10,000 based on convergence criteria provide in Sample et al. (1996a).

To estimate the average estimated daily dose (AEDD) distribution for a receptor:

1. The Bootstrapping Method will be used to randomly select N number of EDD from the EDD distribution above, where N = Number of days/year the receptor is exposed within site exposure areas.
2. AEDD, defined as the arithmetic mean of the selected EDDs, will be calculated.
3. Steps #1 and #2 will be repeated a pre-set number of times to estimate the AEDD distribution; the number of iterations will be pre-set at 10,000 based on convergence criteria provide in Sample et al. (1996a).

The following section presents the basis for selecting receptors of concern and model parameters used in deterministic and probabilistic dietary exposure modeling.

Receptors of Concern

Ecological exposure areas identified in the BERA WP may support multiple terrestrial and semi-aquatic wildlife receptors of concern (EHS Support, 2018). As indicated in the BERA WP, exposure to avian and mammalian wildlife receptors will be evaluated based on dietary exposure pathways using the approach presented in this technical memorandum. Exposure to other ecological receptors of concern, including fish, reptiles, and amphibians, will be evaluated based on direct contact exposure pathways in the BERA (EHS Support, 2018).

Several surrogate species were identified in the BERA WP as representative species to evaluate exposure to mammalian and avian receptors based on feeding guild using dietary exposure models. Representative terrestrial species for each receptor group based on feeding guild include:



Receptor Group	Scientific Name	Common Name
Mammalian Fauna		
Herbivorous mammal	<i>Microtus pennsylvanicus</i>	Meadow Vole
Insectivorous mammal	<i>Blarina brevicauda</i>	Northern Short-tailed Shrew
Carnivorous mammal	<i>Mustela frenata</i>	Long-tailed Weasel
Avian Fauna		
Herbivorous bird	<i>Zenaida macroura</i>	Mourning Dove
Insectivorous bird	<i>Scolopax minor</i>	Woodcock
Carnivorous bird	<i>Buteo jamaicensis</i>	Red-tailed Hawk

Representative semi-aquatic species for each receptor group based on feeding guild include:

Receptor Group	Scientific Name	Common Name
Mammalian Fauna		
Piscivorous mammal	<i>Mustela vison</i>	Mink
Avian Fauna		
Insectivorous bird	<i>Cinclus mexicanus</i>	American Dipper
Piscivorous bird	<i>Megaceryle alcyon</i>	Belted Kingfisher

In addition to the mammalian and avian receptors representing feeding guilds expected to be present at the site, potential dietary exposure to four federally threatened (or proposed threatened) species identified by the United States Fish and Wildlife Service Information for Planning and Consultation¹ (USFWS IPaC) will also be evaluated (EHS Support, 2018):

Scientific Name	Common Name	Status	Potential Exposure Area – General Habitat
Mammals			
<i>Lynx canadensis</i>	Canada Lynx	Threatened	Terrestrial – Boreal spruce-fir forest habitat
<i>Ursus arctos horribilis</i>	Grizzly Bear	Threatened	Terrestrial – Relatively undisturbed mountainous habitat
<i>Gulo gulo luscus</i>	North American Wolverine	Proposed Threatened	Terrestrial – High elevation habitat near the tree-line
Birds			
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	Threatened	Terrestrial – Dense, cottonwood-dominated forests canopies

¹ Accessed at: <https://ecos.fws.gov/ipac>



The following sections present receptor-specific exposure factors selected to estimate dietary doses to wildlife receptors of concern.

Receptor-Specific Exposure Factors

Receptor-specific exposure factors were identified to estimate exposure and area use for identified wildlife receptors of concern evaluated in dietary exposure models. Receptor-specific exposure factors used in the dietary exposure models include:

- BW
- FIR_{dw}
- SIR_{dw}
- WIR
- Dietary composition, proportion of dietary item j to total diet (f_j)
- AUF

Receptor-specific exposure parameters will be derived from general literature sources and compilations of exposure factors developed to support dietary exposure modeling (e.g., USEPA, 1993; USEPA, 2007a; USCHPPM, 2004; Sample and Suter, 1994).

Deterministic exposure modeling uses exposure factors that are representative of typical or average (e.g., mean parameter) exposure conditions. Probabilistic exposure modeling evaluates a range of potential exposure factors to capture the individual- and population-level variation in exposure factors that are likely to occur within exposure areas. A summary of exposure factors that will be used in the deterministic exposure model is presented in **Table 2**. The approach for selecting exposure factors for dietary exposure models is summarized below.

Body Weight

In deterministic exposure models, representative body weights will be estimated as arithmetic mean values of adult body weights reported in the literature or midpoints of the range of body weights when arithmetic mean values are not available (**Table 2**). When body weights are available for both sexes, the more conservative (lower) estimate of the average body weight will be selected. Minimum body weights were identified from the available literature as conservative body weight estimates for special status species, including Canada lynx, grizzly bear, and North American wolverine (**Table 2**).

For probabilistic exposure estimates, distributions of potential body weights of adult receptors will be estimated using R based on available arithmetic mean (μ) and standard deviation (σ) of body weights reported in the literature for the selected receptors (**Table 2**). Normal distributions of potential body weights will be assumed for each receptor. Estimated distributions of potential body weights will be truncated to the range of body weights reported in the literature to avoid unrealistic estimates of receptor body weight (i.e., the distribution of potential body weights will not include values that are greater than or less than the range of body weights reported in the literature).



Food Ingestion Rate

Food ingestion rates FIR_{dw} will be estimated based on receptor-specific BW values using appropriate empirical allometric (scaling) relationships developed by Nagy (2001). Nagy (2001) derived allometric relationships for various avian and mammalian feeding groups based on taxon, habitat, and diet. For each wildlife receptor, the most appropriate allometric equation from Nagy (2001) will be used to estimate dry weight food ingestion FIR_{dw} as a function of BW (**Table 2**):

$$FIR_{dw} = a \times BW^b \quad (3)$$

where:

FIR_{dw} = Dry weight food ingestion rate (kg dry weight/day)

BW = Receptor-specific body weight (kg)

a and b = Parameters whose values are specific to an allometric equation (see **Table 2**)

In deterministic exposure models, the receptor-specific FIR_{dw} estimated from the appropriate allometric relationship will be used based on average body weight in the point estimate calculation of the EDD. For probabilistic exposure models, distributions of FIR_{dw} will be developed based on allometric relationships using randomly selected body weights from the body weight distribution described in the preceding section. The randomly selected body weights will be used to estimate corresponding FIR_{dw} values using the appropriate form of Equation 3 for the receptor of concern. The resulting distribution of FIR_{dw} will be representative of the range of feeding rates that may be observed within a given receptor population as a function of the potential range of body weights of individuals within the population.

Potential distributions of FIR_{dw} values will not be developed directly from literature-reported values for the following reasons:

- Literature-derived FIRs (primarily mean values) are insufficient to generate robust distributions.
- It is inappropriate to evaluate FIR_{dw} independent of BW; if BW and FIR_{dw} are independent in a probabilistic simulation, a receptor at the lower end of the BW distribution may be unrealistically paired with a FIR_{dw} value at the higher end of the FIR_{dw} distribution.

Incidental Substrate Ingestion Rate

Exposure models account for the dietary intake of soil or sediment (substrate) that may be ingested incidentally because of the feeding behavior of select receptors or indirectly through the ingestion of prey. Incidental substrate ingestion rates (SIR_{dw}) will be estimated based on the average incidental substrate ingestion as a percentage of dry food intake based on FIR_{dw} values derived by Nagy (2001) using the approach described in the preceding section. SIR_{dw} will be expressed as a proportion of the dry food ingestion rate, as follows:

$$SIR = FIR_{dw} \times \left(\frac{P_s}{100}\right) \quad (4)$$

where:

SIR_{dw} = Substrate ingestion rate (kg dry weight/day)

FIR_{dw} = Dry weight food ingestion rate (kg dry weight/day)

P_s = Percentage of dry food intake ingested as substrate



As summarized in **Table 2**, average substrate ingestion, as a percentage of dry food intake, was identified for each receptor of concern based on literature sources. For receptors included in the derivation of Eco-SSLs, the average percentage of dry food intake was obtained from USEPA (2007a). For primarily piscivorous wildlife (mink and belted kingfisher), incidental substrate ingestion was assumed to be negligible, consistent with Sample and Suter (1994). For carnivorous mammals, including Canada lynx, grizzly bear, and North American wolverine, incidental substrate ingestion was assumed to not exceed the average incidental ingestion rate for the red fox reported in Beyer et al. (1994). No incidental substrate ingestion data were identified for the American dipper; therefore, a nominal incidental substrate ingestion rate of 1 percent of dry intake was assumed for American dipper (**Table 2**). However, based on the habitat preference of American dipper for fast-moving, clear streams with sand, pebble, or rocky stream bottoms, the assumption of 1 percent incidental substrate ingestion is likely conservative. Further evaluation of this assumption may be warranted in the BERA pending the potential influence of incidental sediment exposure in the risk characterization for American dipper.

For the deterministic exposure model, the receptor-specific SIR_{dw} will be estimated as a single point estimate based on the dry weight FIR_{dw} calculated using average BW and the average percentage of dry food intake as incidental substrate ingestion (**Table 2**).

For probabilistic exposure models, a distribution of potential SIRs will be developed for each receptor based on the distribution of FIR_{dw} described in the previous section. The distribution of SIRs will be developed based on randomly selected BW values used to develop the distribution of FIR_{dw} . For each randomly selected body weight, a corresponding SIR_{dw} will be calculated using the dry weight FIR_{dw} and the average percentage of dry food intake as incidental substrate ingestion. The receptor-specific distribution of SIRs is representative of the range of rates that may be observed within a given receptor population as a function of the potential range of body weights and corresponding food ingestion rates of individuals within that population.

Drinking Water Ingestion Rate

Drinking-water ingestion rates (WIRs) will also be derived based on an allometric relationships to body weight. For birds, Calder and Braun (1983) developed an equation for drinking-water ingestion based on a dataset representing 21 bird species with a body weights ranging from 0.011 to 3.15 kg, which encompasses the range of average avian body weights included in the exposure modeling for the Site (**Table 2**). WIRs for avian receptors will be estimated based on body weight as follows:

$$WIR_{avian} = 0.059 \times BW^{0.67} \quad (5)$$

where:

WIR_{avian} = Avian drinking water ingestion rate (L/day)

BW = Receptor body weight (kg)

Drinking-water ingestion rates for mammalian receptors ($WIR_{mammalian}$) will be estimated based on an allometric relationship to body weight using an analogous equation from Calder and Braun (1983):

$$WIR_{mammalian} = 0.099 \times BW^{0.90} \quad (6)$$

where:

$WIR_{mammalian}$ = Mammalian drinking-water ingestion rate (L/day)



BW = Receptor body weight (kg)

Like other ingestion rates based on allometric relationships (e.g., FIR_{dw} and SIR_{dw}), estimates of WIR in deterministic exposure models will be based on arithmetic mean values of adult body weights reported in the literature or minimum body weights when arithmetic mean values are not available (**Table 2**). For probabilistic exposure models, WIRs will be calculated from randomly selected body weights used to develop the receptor-specific distributions of body weight, FIR_{dw} , and SIR_{dw} . Estimated WIRs calculated for each randomly selected body weight form a receptor-specific distribution that is representative of the range of drinking water rates that may be observed within a given receptor population, as a function of the potential range of body weights of individuals within that population.

Dietary Preference

Dietary models are developed to evaluate exposure to various trophic categories of wildlife based on typical feeding behaviors. Receptors select dietary items based on species-specific foraging strategies and behaviors, which are also influenced by the availability and abundance of dietary items within an exposure area. The relative compositions of prey items in the diets of wildlife receptors of concern will be estimated based on dietary studies obtained from the literature and summarized in compilations of exposure factors developed to support dietary exposure modeling (USEPA, 1993; USEPA, 2007a; USCHPPM, 2004; Sample and Suter, 1994).

Estimates of dietary composition in deterministic exposure models will be simplified initially to represent the predominant dietary items and/or more conservative exposure scenarios based on literature. A summary of the preliminary dietary compositions for the various receptors that will be evaluated in deterministic exposure models is presented in **Table 2**.

Probabilistic exposure estimates may consider the probability of a receptor selecting and ingesting a certain dietary item during foraging. USEPA (2003a) developed an algorithm to construct a unique and randomly selected diet for receptors based on a dietary matrix. A similar approach may be used to account for potential variability in dietary composition if probabilistic dietary exposure modeling is conducted in the BERA. If this approach is warranted, further documentation will be presented in the appendix describing the wildlife modeling procedures in the BERA Report.

Exposure Point Concentrations

Exposure variables refer to site-specific measurements, namely COPEC concentrations estimated in exposure media. The following sections describe the approach for defining EPCs for deterministic and probabilistic exposure modeling.

Deterministic Exposure Point Concentrations

EPCs to evaluate wildlife exposure in deterministic models in the BERA will be estimated for each exposure area using data collected as part of the Phase I and Phase II Site Characterization. EPCs will be calculated to represent a range of exposure scenarios:

- Maximum EPC: Represents a maximum exposure scenario based on the maximum measured concentration in each exposure area.



- Refined EPC: Represents the likely exposure to a conservative estimate of the mean concentrations at the site, assuming random foraging throughout each exposure area.

Refined EPCs for evaluating wildlife ingestion pathways will be calculated based on upper confidence limit of the mean (UCL_{mean}) COPEC concentrations. UCL_{mean} values represent a conservative estimate of average exposure conditions for a receptor foraging randomly over an exposure area. UCL_{mean} concentrations will be calculated using USEPA ProUCL software (version 5.1 or later) and the statistical approach will be consistent with USEPA ProUCL Version 5.1 Technical Guidance (USEPA, 2015). The UCL_{mean} calculation recommended in ProUCL will typically be used as the refined EPC in the risk estimate. However, ProUCL occasionally recommends the 97.5 or 99% UCL on the arithmetic mean estimated by the Chebyshev method when other methods (e.g., Hall's or bootstrap-t UCL with outliers) result in a 95% UCL that exceeds the maximum value. In these cases, the data will be reviewed, and the 95% UCL estimated by the Chebyshev method may be selected as the EPC in those situations to be consistent with the intent of the reasonable maximum exposure paradigm as defined by EPA (1989; 2002). This approach is also consistent with ProUCL technical guidance (EPA, 2015). EPCs for large-range receptors that include multiple exposure areas (up to and including all exposure areas within the Site), will be calculated using a sum of spatially-weighted estimated daily doses (EDDs) from each of the exposure areas where the receptor may forage. For example, if the size of the Main Plant Area is 70% of the receptor home range, and other sampled areas outside the Main Plant Area (but within the home range of the species) includes an additional 20% (with off-site areas comprising the remaining 10% of the home range), then the total EDD will be equal to $(0.7 \times \text{Main Plant Area EDD}) + (0.2 \times \text{non-Main Plant Area EDD})$ for each chemical.

In addition to UCL_{mean} EPCs, exposure will also be evaluated on a point-by-point basis for wildlife receptors with small home ranges (e.g., meadow vole, short-tailed shrew). Point-by-point comparisons will be conducted for COPECs with maximum EPCs resulting in EDDs that exceed TRV_{Low} doses. The evaluation of potential exposure on a point-by-point basis will support a spatial evaluation of areas where small home range receptors may be exposed to concentrations in soil that may result in adverse effects.

EPCs for small home-range receptors will also be determined for incremental soil methodology (ISM) samples collected in the 43 decision units (DU) within the Operational Soil Area (Roux Associates, 2015). The DUs are approximately 1 acre in size. As indicated in the Phase II Site Characterization Sampling and Analysis Plan (Roux Associates, 2018), replicate ISM samples ($r=3$) will be collected from four DUs within the Operational Soil Area (approximately ten percent of the total number of DUs in the Operational Soil Area). UCL_{mean} concentrations to estimate EPCs for the DUs with replicate ISM samples will be calculated using the Chebyshev UCL or Student's t UCL methods using the 95% UCL Calculator developed by the ITRC (ITRC, 2012). Given that DUs in the Operational Soil Area have a similar conceptual site model, including similar soil type, site use/history, and expected contaminant types, ISM replicates from the four DUs will be used to provide an estimate of ISM sample variability within a DU. Estimates of ISM sample variability will be extrapolated to similar DUs without replicate ISM samples (similar to how laboratories use batch replicates for determining lab analysis precision). The extrapolation of estimated variability measured in DUs with ISM replication will be conducted in accordance with the guidance



provided in ITRC (2012) based on an evaluation of ISM mean and variance estimates, including relative standard deviation (RSD)² and standard deviation, from the DUs with ISM replication.

The Operational Soil Area where the ISM sample grids are located represents a sub-area that overlaps previously established ecological exposure areas, specifically the Central Landfill Area and the Main Plant Area. Soil grab samples were also collected within the ISM sampling grids during Phase I and Phase II. Due to different underlying statistical properties, it is not appropriate to combine data derived from ISM and grab samples to calculate statistical parameters (e.g., UCL_{mean} EPCs for large-range receptors). The collection of grab samples was performed across the entire Site (including the Operational Soil Area) to fully characterize potential risk to ecological receptors. The ISM samples were only collected in a sub-area of the facility where contamination was suspected, but the locations of specific source areas and exposure pathways were not known. Therefore, data from grab samples that are nested within the ISM grids will be included in the Site-wide database that will be used to calculate EPCs for large ranging receptors that may forage in multiple exposure areas. The ISM soil data collected within the Operational Area will not be evaluated for large-range receptors and will only be evaluated in the BERA as focused areas of exposure for small ranging and sessile ecological receptors. ISM results (i.e., the concentrations resulting from the single replicate, or from the UCL_{mean} calculation performed on the DUs with triplicate samples) will be evaluated for each grid based on point-by-point comparisons with ecological benchmarks to evaluate soil exposure to plants, soil invertebrates, and wildlife receptors with foraging ranges less than the size (approximately one acre) of the ISM DUs. Results from grab samples that are appropriate for use in the BERA and that overlap the Operational Area ISM sample grid will also be included (along with all other grab samples within the ecologically relevant soil depth interval across the Site) in the point-by-point evaluation for small range and sessile ecological receptors.

The following sections discuss media-specific approaches for data compilation and pre-processing to support the estimation of EPCs.

Soil

For receptors that receive a majority of their soil exposure at the surface, only data from the surficial soil sampling interval (0 to 0.5 feet below ground surface [ft bgs]). For receptors whose life history patterns indicate the potential for regular exposure to deeper soil (e.g., the short-tailed shrew, meadow vole, long-tailed weasel, and North American wolverine), dietary ingestion pathways associated with soils will be based on depth-weighted average concentrations of sampling intervals collected from 0-0.5 feet below ground surface (ft bgs) and 0.5-2.0 ft bgs to provide a representative EPC for each soil boring station. Depth-weighted average concentrations for the combined 0-2 ft bgs exposure interval will be calculated as follows:

$$C_{soil,0-2ft} = C_{soil,0-0.5ft} \times \frac{0.5ft}{2ft} + C_{soil,0.5-2ft} \times \frac{1.5ft}{2ft} \quad (7)$$

where:

$C_{soil,0-2ft}$ = Concentration in combined exposure interval starting from 0 to 2 ft bgs
 $C_{soil,0-0.5ft}$ = Concentration in sampling interval starting from 0 to 0.5 ft bgs

² Relative standard deviation (RSD) is calculated as the standard deviation divided by the arithmetic mean. RSD is also referred to as the coefficient of variation (CV).



$C_{soil,0.5-2\text{ ft}}$ = Concentration in sampling interval starting from 0.5 to 2 ft bgs

As indicated in the BERA WP, sediment data from the 0 to 0.5 ft bgs sampling interval will be included in soil EPC calculations for transitional exposure areas that may be seasonally dry and provide habitat for terrestrial receptors. As described in the BERA WP, transitional exposure areas include (EHS Support, 2018):

- North Percolation Pond Area
- South Percolation Pond Area
- Cedar Creek Reservoir Overflow Ditch
- Northern Surface Water Feature

Sediment

EPCs for sediment in aquatic exposure areas will be calculated based on surficial samples collected from the 0 to 0.5 ft bgs (nominal) sampling interval. Preliminary EPCs will be based on the maximum measured concentration within an exposure area to represent the most conservative exposure scenario. Refined EPCs will include a conservative estimate of the central tendency of exposure (e.g., UCL_{mean} concentration) to reflect the average dose that a receptor may experience while foraging randomly within an exposure area.

As indicated in the BERA WP, surficial soil data from the 0 to 0.5 ft bgs sampling interval will be included in sediment EPC calculations for transitional exposure areas that may be seasonally inundated and provide temporary aquatic habitat, in addition to terrestrial habitat. As described in the BERA WP, transitional exposure areas include (EHS Support, 2018):

- North Percolation Pond Area
- South Percolation Pond Area
- Cedar Creek Reservoir Overflow Ditch
- Northern Surface Water Feature

Surface Water

Relevant surface water sources that will be used as drinking water sources in the dietary exposure models for small-ranging (S) and long-ranging (L) terrestrial wildlife receptors are summarized below by terrestrial exposure area:



Exposure Area	Surface Water Source					
	Cedar Creek	Cedar Creek Resv. Overflow	North Percolation Ponds	South Percolation Ponds	Flathead River	Northern Surface Water Feature
Eastern Undeveloped Area	L	S,L	L	L	L	L
North-Central Undeveloped Area	L	S,L	S,L	L	L	S,L
Western Undeveloped Area	S,L	L	L	L	L	L
Central Landfill Area	L	S,L	S,L	L	L	L
Industrial Landfill Area	L	S,L	L	L	L	S,L
Main Plant Area	L	L	S,L	L	L	L
Flathead River Riparian Area	L	L	L	S,L	S,L	L
Flathead River Riparian Area	L	L	L	S,L	S,L	L

Notes:

S, Small-ranging receptors

L, Long-ranging receptors

For long-ranging receptors, potential drinking water sources will include an estimate of average exposure point concentrations (e.g., UCL_{mean}) from multiple surface water features that may be encountered while foraging. For receptors with small home ranges, surface water features within or adjacent to terrestrial exposure areas will be considered the primary drinking water source. It will be assumed that semi-aquatic wildlife receptors obtain drinking water from the aquatic or transitional exposure areas from which dietary and incidental ingestion exposure pathways are evaluated. Surface water EPCs will be estimated based on COPEC concentrations measured in unfiltered surface water samples. Consistent with other exposure media, preliminary surface water EPCs will be estimated based on maximum COPEC concentrations and refined EPCs will be estimated on a conservative estimate of the central tendency of exposure (e.g., UCL_{mean} EPC concentration).

Probabilistic Exposure Point Concentrations

For probabilistic estimates, wildlife exposures will be evaluated based on the distribution of possible exposure concentrations, in contrast to the point estimate EPCs described above for deterministic models. Distributions of potential exposure concentrations will be developed in the statistical computing and graphics language R (R Core Team, 2013) based on the soil, sediment, and surface water datasets collected during Phase I and Phase II Site Characterization sampling, as described above for the estimation of deterministic EPCs. EPC distributions will represent the range of potential exposure concentrations that may be experienced by a given receptor foraging within exposure areas at the site. The simulated exposure distributions may be truncated at 0, if necessary, to prevent the simulation from selecting negative exposure concentrations. Extreme concentrations at the upper tail of the simulated distribution will be retained in the primary exposure calculations. However, if extreme concentrations are observed at the upper tail of the simulated distribution, the upper tail of the simulated exposure



distribution may be truncated based on the upper tolerance limit of the site-specific dataset and evaluated as a separate scenario in the uncertainty section of the BERA.

Terrestrial Bioaccumulation Relationships

Bioaccumulation of COPECs from soil into terrestrial dietary items, including vegetation, soil invertebrate tissue, and small mammal tissue will be estimated using soil EPCs described in the preceding section and terrestrial bioaccumulation factors (BAFs). BAFs are regression models or constant uptake factors that reflect the relationship between COPEC concentrations in dietary items and concentrations in soil. Differences in concentration are due to COPEC-specific properties that affect its tendency to bioaccumulate in tissue, balanced by the innate ability of the species to regulate body burden levels of the chemical via metabolic and excretory processes. Environmental conditions such as soil moisture, soil pH, and cation exchange capacities significantly influence whether soil COPECs remain bound in the soil matrix or can be mobilized (in a bioavailable form) and released for uptake.

The selection of appropriate BAFs is a critical component to dietary exposure modeling. General approaches for BAF selection have been discussed in Sample and Suter (1994) and USEPA (2007a). An approach that is consistent with these sources was followed in the selection of BAFs for the CFAC Site. The general hierarchy for selection of BAFs based on types of sources is as follows:

1. Use of regression equations derived from paired field- or laboratory-based measurements of COPEC concentrations in dietary items and soil
2. Ratio-derived BAFs developed based on paired data where the BAF is equal to the dietary tissue concentration divided by the soil concentration
3. Modeled equilibrium partitioning-derived BAFs based on physical or chemical characteristics
4. Assumptions based on values common to chemical class

The use of empirically derived BAF ratios is generally preferred over equilibrium partitioning-based BAFs, which are typically calculated based on factors such as log K_{ow} values, fraction of organic carbon in soil, and/or percent of lipids in invertebrates. Also, in selecting ratio-based BAFs, median values are generally preferred for use over maximum or other high-end BAFs (USEPA, 2007a).

Regression equations used to calculate COPEC concentrations in dietary items based on soil concentrations typically take the following form:

$$\ln C_j = B1 \times \ln C_{sub} + B0 \quad (8)$$

where:

$\ln C_j$ = Natural log of the COPEC concentration in dietary item j

$\ln C_{sub}$ = Natural log COPEC concentration in substrate (e.g., soil)

$B1$ = Slope of the food/prey-soil regression

$B0$ = Intercept of the food/prey-soil regression

Ratio-derived BAFs can be generally presented as follows:

$$C_j = BAF \times C_{sub} \quad (9)$$



where:

C_j = COPEC concentration in dietary item j (mg COPEC/kg tissue, dry weight)

C_{sub} = COPEC concentration in soil or sediment (mg COPEC/kg sediment or soil, dry weight)

BAF = Bioaccumulation factor developed based on paired empirical data where the BAF is equal to the dietary tissue concentration divided by the soil concentration (kg substrate/kg tissue, dry weight)

BAFs calculated based on equilibrium partitioning for non-ionic organic compounds are based on the log K_{ow} of the constituent:

$$\log BAF = B1 \times \log K_{ow} + B0 \quad (10)$$

where:

BAF = Bioaccumulation factor

K_{ow} = Octanol-water partitioning coefficient

$B1$ = Slope of the BAF -log K_{ow} regression

$B0$ = Intercept of the BAF -log K_{ow} regression

BAFs calculated based on equilibrium partitioning are applied as ratio-based BAFs to estimate a dietary tissue concentration value. K_{ow} values to estimate BAFs based on equilibrium partitioning were obtained from USEPA Estimation Program Interface Suite K_{ow} Win v. 1.68 software program.

Finally, where ratio-based BAFs are not available and where no equilibrium partitioning method has been developed for calculating BAFs, other methods, such as using BAFs for chemicals within the same class and with similar structural properties, may be adopted as surrogate BAFs.

Terrestrial BAFs will be derived to estimate dry weight concentrations of dietary items, consistent with the reporting of soil COPEC concentrations in dry weight and the calculation of dry weight food ingestion rates FIR_{dw} (see Equation 1). **Table 3** presents a summary of the terrestrial BAFs that will be used to estimate COPEC uptake from soil into terrestrial dietary items, including plants, soil invertebrates, and small mammals. Estimated concentrations in terrestrial items are also presented based on example EPCs. The following sections discuss the basis for selecting terrestrial BAFs to represent uptake into each terrestrial dietary item.

Terrestrial Plants

The following sections provide the basis for estimating COPEC bioaccumulation from soil into terrestrial vegetation for major constituent groups. **Table 3** presents a summary of terrestrial plant BAFs and associated references.

Metals

Soil-to-plant bioaccumulation relationships for metals were primarily selected from literature sources adopted by USEPA in the derivation of Eco-SSLs (**Table 3**). Bioaccumulation relationships derived in Bechtel-Jacobs (1998a) were the primary soil-to-plant uptake relationships adopted in the Eco-SSL development (USEPA, 2007a). Regression equations were used to estimate plant tissue concentrations



for six metals based on relationships derived in Bechtel-Jacobs (1998a) and two metals based on relationships derived in USEPA (2007a). Slope and intercept values used in soil-to-plant regressions are provided in **Table 3**. Bioaccumulation factors were selected for other metals based on median BAFs derived in Bechtel-Jacobs (1998a) or soil-to-plant BAFs derived in Baes et al. (1984).

Other Inorganics

Soil-to-plant bioaccumulation data were limited for fluoride and cyanide (**Table 3**). A ratio-derived soil-to-plant BAF was identified for fluoride based on Baes et al. (1984). Based on Lanno and Menzie (2005), cyanide bioaccumulation into plant tissues was assumed to be negligible for soil uptake pathways. Bioaccumulation and trophic transfer via the food web is not considered to be a significant pathway for inorganic cyanide compounds (Lanno and Menzie, 2005).

Semi-Volatile Organic Compounds – Polycyclic Aromatic Hydrocarbons

Soil-to-plant bioaccumulation relationships for polycyclic aromatic hydrocarbons (PAHs) were selected based on relationships derived for low molecular weight (LMW) and high molecular weight (HMW) PAHs by USEPA in the derivation of Eco-SSLs (USEPA, 2007a). LMW PAHs typically have three or less condensed aromatic rings, while HMW PAHs have four or more aromatic rings. Acceptable compound-specific regression relationships were derived for LMW PAHs, except fluoranthene and naphthalene, and HMW PAHs, except benzo(b)fluoranthene, benzo(e)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and pyrene (**Table 3**). Slope and intercept values used in soil-to-plant regressions are provided in **Table 3**. For LMW and HMW PAHs without acceptable regression relationships, median ratio-derived BAFs were used to estimate soil-to-plant uptake (**Table 3**; USEPA, 2007a).

Volatile and Non-PAH Semi-Volatile Organic Compounds

Compound-specific soil-to-plant BAFs were not identified for methylcyclohexane, a volatile organic compound (VOC), or non-PAH semi-volatile organic compounds (SVOCs) identified as soil COPECs, except for pentachlorophenol (PCP). USEPA (2007a) recommends a median BAF from bioaccumulation data for PCP in plants of 5.93. For all other non-ionic compounds in this chemical class, the significant regression equation derived for rinsed plant foliage in USEPA (2007a) will be used to estimate the soil-to-plant BAF as a function of $\log K_{ow}$ based on the following relationship:

$$\log BAF = -0.4057 \times \log K_{ow} + 1.781 \quad (11)$$

where:

BAF = Soil-plant BAF for non-ionic organic constituents

K_{ow} = Octanol-water partitioning coefficient

Compound-specific soil-to-plant BAF values derived from this relationship will be multiplied by the soil EPC to estimate the concentration of non-PAH SVOCs in terrestrial plant tissue (**Table 3**).

Dioxins/Furans

Chemical-specific soil to plant BAFs were not identified for dioxins/furans. Therefore, the regression equation for the uptake of non-ionic organic constituents from soil to rinsed foliage derived in USEPA



(2007a) will be used to estimate uptake from soil to plant tissue for the dioxin/furan congeners identified as COPECs at the site (see Equation 11 above). The application of this regression relationship to estimate soil-to-plant BAFs for dioxin/furans is consistent with the approach used in the Los Alamos National Laboratory (LANL) EcoRisk Database, Release 4.1 (LANL, 2017).

Soil Invertebrates

The following sections provide the basis for estimating COPEC bioaccumulation from soil into soil invertebrate tissue for major constituent groups. **Table 3** presents a summary of soil invertebrate BAFs and associated references.

Metals

Soil-to-soil invertebrate bioaccumulation relationships for metals were primarily selected from literature sources adopted by USEPA in the derivation of Eco-SSLs (**Table 3**). Bioaccumulation relationships derived in Sample et al. (1998a) and Sample et al. (1999) were the primary soil-to-soil invertebrate uptake relationships adopted in the Eco-SSL development (USEPA, 2007a). Regression equations were used to estimate soil invertebrate tissue concentrations for six metals based on relationships derived in Sample et al. (1998a) and Sample et al. (1999). Slope and intercept values used in soil-to-soil invertebrate regressions are provided in **Table 3**. Ratio-derived bioaccumulation factors were selected for other metals based on median BAFs derived in Sample et al. (1998a). The median soil-to-insect BAF reported in USACHPPM (2004) was selected as the BAF for thallium (**Table 3**). Soil-to-soil invertebrate bioaccumulation data were not identified for antimony; therefore, a conservative default BAF of 1 was applied, consistent with USEPA (2007a).

Other Inorganics

Soil-to-soil invertebrate bioaccumulation data were limited for fluoride and cyanide (**Table 3**). A ratio-derived soil-to-plant BAF was identified for fluoride based on the median soil-to-insect BAF reported in USACHPPM (2004). Cyanide bioaccumulation into soil invertebrates was assumed to be negligible for soil uptake pathways, consistent with Lanno and Menzie (2005).

Semi-Volatile Organic Compounds – Polycyclic Aromatic Hydrocarbons

Soil-to-soil invertebrate BAFs for LMW and HMW PAHs were selected from BAFs derived using the partitioning model presented in USEPA (2007a). The model estimates the biota-to-soil water partitioning coefficient (K_{ws}) and divides it by the soil-to-water partitioning coefficient (K_d) to calculate the soil-to-earthworm BAF. USEPA (2007a) used soil organic carbon-to-water partitioning coefficient (K_{oc}) to calculate K_d using the class-specific models presented in Gerstl (1990). Further detail regarding the calculation of soil-to-earthworm BAFs for LMW and HMW PAHs is provided in Section 3.2.2 and Table 5 in USEPA (2007a). Ratio-based soil-to-earthworm BAF values derived in USEPA (2007a) using this modeling approach will be multiplied by soil EPCs to estimate the concentrations of LMW and HMW PAHs in soil invertebrate tissues (**Table 3**).



Volatile and Non-PAH Semi-Volatile Organic Compounds

Compound-specific soil-to-soil invertebrate BAFs were not identified for methylcyclohexane or non-PAH SVOCs identified as soil COPECs, except for PCP. USEPA (2007a) developed a significant regression model to estimate PCP uptake into earthworms; however, the Eco-SSL calculated using this significant regression equation resulted in a soil concentration that was lower than the range of data used to derive the bioaccumulation regression relationship. Therefore, USEPA (2007a) applied a ratio-derived soil-to-earthworm BAF of 14.63 based on the median BAF from empirical studies to estimate soil-to-soil earthworm uptake of PCP. Consistent with USEPA (2007a), the median ratio-derived BAF will be used to estimate PCP concentrations in soil invertebrate tissue in the BERA (**Table 3**).

For other non-ionic compounds in this chemical class, the partitioning model approach applied by USEPA (2007) to estimate soil-to-soil invertebrate BAFs will be used to estimate soil-to-soil invertebrate BAFs in the BERA. Further detail regarding the approach for calculating soil-to-earthworm BAFs for non-ionic organic constituents is provided in Section 3.2.2 in USEPA (2007a). **Table 4** presents the calculations of soil-to-soil invertebrate BAFs for non-PAH SVOC COPECs in soil using the partitioning modeling approach.

Dioxins/Furans

Bioaccumulation of dioxin/furans from soil to earthworm tissues was estimated based on the relationship derived by Sample et al. (1998a):

$$\ln C_{invert} = 3.533 \times \ln C_{soil} + 1.182 \quad (12)$$

where:

C_{invert} = Concentration in soil invertebrate (mg COPEC/kg tissue, dry weight)
 C_{soil} = COPEC concentration in soil (mg COPEC/kg soil, dry weight)

Small Mammals

The following sections provide the basis for estimating COPEC bioaccumulation from soil into mammal tissue for major constituent groups. **Table 3** presents a summary of small mammal BAFs and associated references.

Metals

Soil-to-small mammal bioaccumulation relationships for metals were primarily selected from literature sources adopted by USEPA in the derivation of Eco-SSLs (**Table 3**). Bioaccumulation relationships derived in Sample et al. (1998b) and Baes et al. (1984) were the primary soil-to-small mammal uptake relationships adopted in the Eco-SSL development (USEPA, 2007a). As indicated in **Table 3**, significant regression equations were used to estimate soil invertebrate tissue concentrations for nine metals based on regressions derived in Sample et al. (1998b). Slope and intercept values used in soil-to-small mammal regressions are provided in **Table 3**. A median ratio-derived soil-to-small mammal BAF was selected for mercury, consistent with LANL (2017).



Ratio-derived bioaccumulation factors were selected for antimony, barium, beryllium, and thallium based on diet-to-beef transfer factors reported in Baes et al. (1984). Consistent with USEPA (2007a), in the absence of alternative bioaccumulation relationships for metals, soil-to-beef transfer factors reported for metals in Baes et al. (1984) were used to estimate soil-to-small mammal BAFs based on the following:

$$BAF_{soil-mammal} = BAF_{soil-diet} \times 50 \times Tf_{diet-mammal} \quad (13)$$

where:

- $BAF_{soil-mammal}$ = Soil-to-small mammal BAF (kg soil/kg mammal tissue, dry weight)
 $BAF_{soil-diet}$ = Soil-to-diet BAF; conservatively assumed to be a soil invertebrate diet (kg soil/kg tissue, dry weight)
 $Tf_{diet-mammal}$ = Transfer factor from diet-to-mammal tissue (day/kg mammal tissue)
50 = Cattle food intake rate of 50 kg/day assumed by Baes et al. (1984)

Diet-to-beef transfer factors from Baes et al. (1984) for antimony, barium, beryllium, and thallium are provided in **Table 3**. Soil-to-small mammal BAF values derived using this approach will be multiplied by the soil EPC to estimate the concentration of these select metals in small mammal tissue (**Table 3**).

Other Inorganics

Soil-to-small mammal bioaccumulation data were limited for fluoride and cyanide (**Table 3**). Ratio-derived soil-to-small mammal BAFs were derived by LANL (2015) for fluoride; the LANL-derived soil-to-small mammal BAF values will be multiplied by soil EPCs to estimate the concentrations of fluoride in small mammal tissue (**Table 3**). Cyanide bioaccumulation into small mammals was assumed to be negligible for soil uptake pathways, consistent with Lanno and Menzie (2005).

Semi-Volatile Organic Compounds – Polycyclic Aromatic Hydrocarbons

Small mammal bioaccumulation data for LMW and HMW PAHs are limited. However, USEPA (2007a) assumes that PAH bioaccumulation is minimal due to the rapid metabolism of these compounds following ingestion by birds and mammals. Consistent with USEPA (2007a), the bioaccumulation of LMW and HMW PAHs in small mammal tissue is assumed to be negligible (**Table 3**).

Volatile and Non-PAH Semi-Volatile Organic Compounds

Compound-specific soil-to-small mammal bioaccumulation data were limited in general literature sources for methylcyclohexane and most non-PAH SVOC soil COPECs. USEPA (2007a) developed a general regression equation for the accumulation of PCP from the diet to chicken tissue; this relationship was assumed to be representative of potential accumulation from the diet to small mammal tissues (USEPA, 2007a). LANL (2015) calculated soil-to-small mammal BAFs for phthalates and hexachlorobenzene. These soil-to-small mammal tissue BAFs were also selected to represent potential bioaccumulation into small mammals at the Site (**Table 3**).

For methylcyclohexane and other non-PAH SVOCs, data for uptake from soil into small mammal tissue are lacking. For these constituents, the model used in the LANL (2017) EcoRisk food chain model to estimate the transfer factor for the flesh of prey items (TF_flesh_dw) will be used to estimate the BAF_{soil-}



mammal value in the BERA. The LANL (2017) model multiplies the uptake factor for beef/cattle, derived using the method recommended in EPA (2005j), by maximum ingestion rates and dietary BAFs of prey items consisting of other modeled receptors with lower trophic orders. To retain consistency with the LANL EcoRisk model, the same receptor species that were assumed in that model to be prey items for higher trophic order receptors were used to develop the CFAC BAFs (i.e., American robin, deer mouse, desert cottontail, and short-tailed shrew). The model equation is as follows:

$$BAF_{soil-mammal} = BAF_{beef} \times \left[\frac{(FIR_{MAX} \times BAF_{MAX Plant/Invert} + SIR_{MAX})}{(1-MC)} \right] \quad (14)$$

where:

- $BAF_{soil-mammal}$ = Soil-to-small mammal BAF (kg soil/kg flesh, dry weight)
- BAF_{beef} = Diet-beef biotransfer factor (day/kg beef, wet weight)
- FIR_{MAX} = Maximum ingestion rate for prey species (kg food/day, dry weight)
- $BAF_{MAX Plant/Invert}$ = Maximum BAF for plant or invertebrate dietary items of the prey species (kg soil, dry weight/kg tissue, wet weight)
- $IR_{soilMAX}$ = Maximum ingestion rate of soil for prey species (kg soil/day, dry weight)
- MC = Moisture content of flesh (assumed 68 percent)

The biotransfer to beef factor is estimated using the following model described in Research Triangle Institute (RTI) (2005) and recommended by EPA (2005j):

$$\log BAF_{beef} = Fat_{beef} \times (-0.099 \times \log K_{ow}^2 + 1.07 \times \log K_{ow} - 3.56) \quad (15)$$

where:

- BAF_{beef} = Diet-beef biotransfer factor (day/kg beef, wet weight)
- Fat_{beef} = Fat content of beef; assumed to be 19 percent or 0.19 based on LANL (2017)
- Kow = Octanol-water partition coefficient

Table 5 presents calculated soil-to-small mammal BAFs estimated for methylcyclohexane and non-PAH SVOCs lacking soil-to-mammal BAFs from other literature sources.

Dioxins/Furans

Sample et al. (1998b) developed bioaccumulation relationships for estimating uptake of TCDD and tetrachlorinated dibenzofuran (TCDF) into small mammal tissue based on empirical data for multiple organism groups. A simple regression equation was recommended to estimate TCDD concentrations in small mammal tissue based on soil concentrations. A median ratio-derived soil-to-small mammal BAF was recommended to estimate TCDF concentrations in small mammal tissue. Consistent with the recommendations in Sample et al. (1998b), the simple regression equation will be used to estimate concentrations of TCDD and other dioxin congeners in small mammals; the median soil-to-small mammal BAF for TCDF will be used to estimate concentrations of TCDF and other furan congeners (**Table 3**).

Aquatic Bioaccumulation Relationships

The development of bioaccumulation relationships in aquatic environments will use similar approaches to those described in the preceding section for terrestrial environments. Bioaccumulation of COPECs



from sediment or surface water into aquatic dietary items of semi-aquatic wildlife receptors, including benthic invertebrates and fish, will be estimated using the sediment EPCs and biota-sediment accumulation factors (BSAFs) or surface water EPCs and bioconcentration factors (BCFs). BSAFs or BCFs will be developed based on regression models or constant uptake factors that reflect the relationship between COPEC concentrations in dietary items and concentrations in sediment or surface water. Like BAFs for soil, the uptake of COPECs into biota within the aquatic environment is influenced by COPEC-specific properties, sediment characteristics (e.g., organic carbon content), receptor physiology, and the characteristics of dietary items (e.g., lipid content).

Table 5 presents a summary of the aquatic BSAFs or BCFs that will be used to estimate COPEC bioaccumulation from sediment or surface water into benthic invertebrates and fish. Estimated COPEC concentrations in aquatic biota are expressed on a dry weight basis based on BSAFs or BCFs derived on a dry weight basis. The following sections discuss the basis for selecting aquatic BSAFs or BCFs to represent uptake into each potential dietary item of semi-aquatic wildlife receptors of concern.

Benthic Invertebrates

Literature-based BSAFs or BCFs will be used to estimate the bioaccumulation of COPECs into benthic invertebrates as a function of sediment or surface water concentrations, respectively (**Table 5**). The following sections provide the basis for estimating COPEC bioaccumulation into benthic invertebrates for major constituent groups.

Metals

Metal concentrations in benthic invertebrates were estimated based on BSAFs presented in literature compilations (e.g., Sample et al., 1998b) and individual studies (**Table 5**). Median BSAF values provided in Sample et al. (1998b) were preferentially used to estimate benthic invertebrate concentrations for metals included in the compilation. For metals not included in Sample et al. (1998b), BSAF values were estimated from individual literature studies. The BSAF for aluminum was estimated as the ratio of mean oligochaete (*Lumbriculus variegatus*) tissue concentrations (dry weight) to mean whole sediment aluminum concentrations (dry weight) reported by Stanley et al. (2010). The median BSAF calculated from the ratios of mean benthic invertebrate tissue and mean whole sediment concentrations reported by Dovick et al. (2015) was used to estimate antimony bioaccumulation into benthic macroinvertebrates. Median BSAFs calculated from paired benthic invertebrate and sediment data reported by Hamilton et al. (2002) were used to estimate concentrations of barium, beryllium, selenium, and vanadium (**Table 5**). Sediment bioaccumulation data for thallium were limited; however, biomonitoring data from Turner et al. (2013) were used to estimate a BSAF for deposit-feeding invertebrates. In the absence of other data, a BSAF calculated as the mean concentration in deposit-feeding invertebrates and mean sediment concentration reported for the Plym estuary by Turner et al. (2013) was used as a BSAF for thallium (**Table 5**).

Other Inorganics

Bioaccumulation information for cyanide and fluoride was evaluated from literature reviews and primary literature. Based on Lanno and Menzie (2005), cyanide bioaccumulation into benthic invertebrates was assumed to be negligible for sediment and surface water uptake pathways.



Bioaccumulation and trophic transfer via the food web is not considered to be a significant pathway for inorganic cyanide compounds (Lanno and Menzie, 2005).

Aqueous exposure to the fluoride ion (F⁻) is the predominant bioaccumulation pathway for aquatic organisms. Given that aqueous exposure is the predominant bioaccumulation pathway, data reported by Aguirre-Sierra et al. (2013) were used to relate aqueous F⁻ concentrations to F⁻ concentrations in muscle tissue and exoskeleton of the freshwater white-clawed crayfish (*Austropotamobius pallipes*). As illustrated in Figure 1a, fluoride bioaccumulation in crayfish exoskeleton and muscle tissue increased exponentially from the control treatment (0.18 ± 0.07 mg/L) to the highest test treatment (84.8 ± 12.4 mg/L). Greater fluoride bioaccumulation was observed in the crayfish exoskeleton relative to muscle tissue, consistent with other studies that indicate greater accumulation in invertebrate exoskeletons (Sands et al. 1998; Camargo, 2003).

Based on the water-to-invertebrate relationships derived from Aguirre-Sierra et al. (2013), F⁻ concentrations in benthic invertebrate tissues will be estimated in the BERA as a function of F⁻ concentrations in unfiltered surface water using the relationship for crayfish muscle tissue (Figure 1a; Table 5):

$$C_{invertebrates} = 24.253 \times e^{(0.0773 \times C_{water})} \quad (16)$$

where:

$C_{invertebrates}$ = Concentration in invertebrate tissue (mg F⁻/kg dry weight)
 C_{water} = Concentration in unfiltered surface water (mg F⁻/L)

The crayfish muscle bioaccumulation relationship derived from data reported by Aguirre-Sierra et al. (2013) was selected to represent the more edible and digestible portions of crayfish tissue that may be consumed by wildlife. Further evaluation of this assumption may be warranted in the BERA pending an analysis of the potential influence of this uncertainty on the risk characterization of F⁻ exposure to semi-aquatic wildlife.

Semi-Volatile Organic Compounds – Polycyclic Aromatic Hydrocarbons

PAH concentrations in benthic invertebrates were estimated based on the biota-sediment accumulation relationship described by DiToro and McGrath (2000) in the development of the target lipid model. BSAFs for PAH compounds were estimated on an organic carbon and lipid-normalized basis as a function of K_{ow} :

$$BSAF_{OC} = \frac{C_{lipid}}{C_{oc}} = K_{ow}^{-0.038} \quad (17)$$

where:

$BSAF_{OC}$ = BSAF normalized by organism lipid content and sediment organic carbon content (kg organic carbon/kg lipid)
 C_{lipid} = Tissue lipid concentration (mg PAH/kg lipid)
 C_{oc} = Sediment organic carbon concentration (mg PAH/kg organic carbon)
 K_{ow} = Octanol-water partitioning coefficient



Organic carbon and lipid-normalized BSAFs were estimated on a dry weight basis using assumed lipid and organic carbon content in sediments as follows:

$$BSAF_{dw} = BSAF_{oc} \times f_{lipid} \times \frac{1}{f_{oc}} \quad (18)$$

where:

- $BSAF_{dw}$ = BSAF specific to prey type and COPEC (kg sediment/kg tissue, dry weight)
- $BSAF_{oc}$ = Organic carbon and lipid-normalized BSAF specific to prey type and COPEC (kg organic carbon/kg lipid)
- f_{lipid} = Fraction of lipid in dietary items (0.065 assumed in **Table 5** for benthic invertebrates)
- f_{oc} = Fraction of organic carbon in sediment (0.01 assumed in **Table 5**)

PAH-specific $BSAF_{dw}$ values will be multiplied by the COPEC concentration in sediment (mg/kg dry weight) to estimate the COPEC concentration in the dietary item (mg/kg dry weight).

Semi-Volatile Organic Compounds – Non-Polycyclic Aromatic Hydrocarbon

Bioaccumulation of other non-ionic organic compounds was assumed to be similar to PAH bioaccumulation. Therefore, BSAFs for non-PAH SVOCs were estimated as a function of K_{ow} using the identical procedures described in the preceding section for PAHs (**Table 5**).

Fish

Literature-based BASFs or BCFs will be used to estimate the bioaccumulation of COPECs into fish tissue as a function of sediment or surface water concentrations, respectively (**Table 5**). The following sections provide the basis for estimating COPEC bioaccumulation into fish for major constituent groups.

Metals

Metal bioaccumulation into fish tissue was estimated based on the bioconcentration of metals from surface water into tissue. Sample et al. (1996b) was selected as a preferential source of BCFs based on a compilation of metal BCF values identified in the literature (**Table 5**). BCF values were not available in Sample et al. (1996b) for barium, silver, and vanadium; therefore, literature studies were reviewed to identify potential bioaccumulation relationships between surface water and fish tissue concentrations. A BCF of 74.4 for barium bioaccumulation into male fish carcass reported by Nakamoto and Hassler (1992) will be used to estimate barium concentrations in fish tissue. A BCF of 106 reported in study of silver bioaccumulation into Common Carp (*Cyprinus carpio*) will be used to estimate silver bioaccumulation into fish tissue (Laplace et al, 1992). CECBP (2008) compiled a range of BCF values from 365-630 for vanadium uptake into fish. Due to the paucity of data to support the calculation of a BCF for vanadium, the most conservative BCF value of 630 will be used to estimate fish tissue concentrations.

BCFs reported by Sample et al. (1996b) are based on wet weight fish tissue concentrations; therefore, BCF values were divided by 0.25 based on assumed percent solids of 25 percent to estimate fish tissue concentrations on a dry weight basis (**Table 5**). The BCF values for barium, silver, and vanadium were also divided by 0.25, based on BCFs being reported on a wet weight tissue basis.



Other Inorganics

Cyanide and fluoride bioaccumulation into fish tissue were evaluated based on literature reviews and primary literature studies. Consistent with Lanno and Menzie (2005), cyanide bioaccumulation into fish tissue was assumed to be negligible for sediment and surface water uptake pathways.

As previously stated for benthic invertebrates, aqueous exposure is the predominant F⁻ bioaccumulation pathway for aquatic organisms. Like invertebrates, F⁻ bioaccumulation in fish tends to be greatest in skeletal tissues, including bones, cartilage, and gills. Shi et al. (2009) evaluated the bioaccumulation of F⁻ from aqueous exposure into multiple tissue compartments in Siberian sturgeon (*Acipenser baerii*). As illustrated in Figure 1b, F⁻ concentrations increased in skeletal tissues (bone, cartilage, and gills) with increasing water concentrations ranging from the control treatment (0.26 ± 0.07 mg/L) to the highest test treatment (51.8 ± 3.5 mg/L). However, F⁻ concentrations in soft tissues, including skin, muscle, and viscera, generally remained unchanged with increasing aqueous exposure.

Based on the assumption that F⁻ concentrations in soft fish tissue, the more edible and digestible portions of fish for potential piscivorous consumers, will not exceed the concentrations in gill tissue, the bioaccumulation relationship derived using data from Shi et al. (2009) for gill tissue will be used as a conservative estimate of F⁻ concentrations in soft tissue compartments of fish (Figure 1b). F⁻ concentrations in fish tissue will be estimated in the BERA as a function of F⁻ concentrations in unfiltered surface water using the relationship derived for bioaccumulation into fish gills (**Table 5**):

$$C_{fish} = 42.377 \times \ln C_{water} + 214.34 \quad (19)$$

where:

C_{fish} = Concentration in fish tissue (mg F⁻/kg dry weight)
 C_{water} = Concentration in unfiltered surface water (mg F⁻/L)

The use of the fish gill bioaccumulation relationship derived from data presented in Shi et al. (2009) conservatively estimates F⁻ concentrations in soft tissues that may be preferentially consumed by piscivorous wildlife receptors (e.g., mink) that typically forage on soft tissue (e.g., skin, muscle, and viscera) and forgo fish carcasses that contain mostly skeletal tissue. The use of this relationship also assumes that whole-body fish tissue concentrations will not exceed concentrations observed in fish gill tissue for those piscivorous wildlife that may consume the entire fish. Further evaluation of these assumptions may be warranted in the BERA pending the potential influence of this uncertainty on the risk characterization of F⁻ exposure to semi-aquatic wildlife.

Semi-Volatile Organic Compounds – Polycyclic Aromatic Hydrocarbons

PAH concentrations in fish tissue were estimated based on the K_{ow}-based biota-sediment accumulation relationship used to estimate PAH concentrations in benthic invertebrates (DiToro and McGrath, 2000). Estimated concentrations were based on the equations presented in the preceding section for benthic invertebrates and an assumed dry weight lipid fraction in fish of 0.085 (**Table 5**). The application of the BSAF relationship from DiToro, and McGrath (2000) conservatively assumes that exposure and uptake to fish within the water column does not exceed exposure and uptake in sediment and pore water within the benthic environment.



Semi-Volatile Organic Compounds – Non-Polycyclic Aromatic Hydrocarbons

Fish tissue concentrations of non-PAH SVOCs were estimated using the K_{ow} -based biota-sediment accumulation relationship used to estimate PAH concentrations in fish tissue, as described in the preceding section (DiToro and McGrath, 2000). Consistent with the approach for benthic invertebrates, this approach assumes that the bioaccumulation of other non-ionic organic compounds is a function of compound-specific K_{ow} , similar to PAHs.

Area Use Factors

In dietary exposure models, the AUF reflects the proportion of the dose that a receptor may obtain while foraging within the a given exposure area. The AUF is primarily estimated based on the ratio of the size of the exposure area to the area of the receptor foraging range. Species with very relatively small home ranges (e.g., meadow vole or short-tailed shrew) may forage entirely within the study area. However, for species with larger home ranges (e.g., large birds and mammals), most of the receptor diet may come from outside of an exposure area or the Site. If the foraging range of a receptor is greater than an exposure area, the EDD will be calculated as the sum of AUF-weighted doses obtained from the exposure areas within the typical home range of the receptor.

Available literature sources use various metrics to represent the size of the area used by a receptor: feeding or foraging radius, feeding or foraging distance, and home range or territory size, etc. In most cases, the size of the area used by a receptor for foraging and feeding is reported in acres and is referred to as the home range or territory. For initial exposure modeling, AUFs will be assigned a value of 1 (i.e., 100 percent foraging within the exposure area) and adjusted subsequently in the refined evaluation based on the corresponding sizes of the receptor-specific home range and the exposure area. Refined AUFs may also account for developed or unvegetated areas of the Site that do not provide habitat or forage base for wildlife receptors; these areas may be excluded from refined dietary exposure estimates due to the absence of forage base.

Seasonal use may also be considered in the calculation of the AUF to estimate the exposure duration for receptors that may only be present seasonally at the Site. Seasonal use will initially be assumed to be 100 percent; however, estimates of seasonal use may be incorporated into the AUF for the refined exposure evaluation in the BERA to address the potential uncertainty associated with the duration of exposure for seasonal receptors at the Site.

Toxicity Reference Values

TRVs will be derived to evaluate the potential for adverse ecological effects associated with the dietary doses estimated using the approaches described in the preceding sections. Two tiers of chronic TRVs representing no-observed-adverse-effect levels (NOAELs) and LOAELs for growth and reproduction endpoints will be identified to evaluate the potential for adverse effects via wildlife ingestion pathways:

- Low TRV (TRV_{Low}): Represents the geometric mean NOAEL TRV identified in literature studies.
- High TRV (TRV_{High}): Represents a TRV-based on chronic exposure, that estimates a representative LOAEL in literature studies.



The two tiers of TRVs will be used to evaluate potential wildlife exposure based on EDDs calculated using preliminary and refined exposure assumptions and EPCs. For receptors with special regulatory status (i.e., threatened or endangered species), the TRV_{Low} will be used to estimate the potential for adverse effects to potential individual receptors within the population.

Preliminary TRVs for bioaccumulative COPECs were identified from primarily peer-reviewed compilations of toxicity data for ecological risk assessment including:

- USEPA Eco-SSLs (USEPA, 2005a)
- LANL EcoRisk (LANL, 2017)
- ORNL *Toxicological Benchmarks for Wildlife: 1996 Revision* (Sample et al., 1996b)

At the request of USEPA, LOAELs provided in TechLaw (2008) and the approach used to derive TRVs in TechLaw (2008) were also considered in the selection of TRVs. TRVs presented in *Development of Toxicity Reference Values for Conducting Ecological Risk Assessment at Naval Facilities in California, Interim Final* (Engineering Field Activity West, 1998) were also considered as a source for toxicity reference values. For constituents lacking toxicity data from these compilations, literature sources were reviewed to identify appropriate TRVs. The following sections summarize the basis for selecting preliminary TRVs from literature/database sources for the BERA; a summary of the TRVs and associated sources is provided in **Table 7**. The BERA Report will also include an appendix that documents the basis for deriving final TRVs used in dietary exposure modeling.

Metals

Avian and mammalian TRVs for metals were selected primarily from TRVs used by the USEPA to develop Eco-SSLs or derived from studies accepted by the USEPA for Eco-SSL derivation (USEPA, 2005). The Eco-SSL approach generally adopted TRVs based on the geometric mean of NOAEL doses for growth and reproduction endpoints from accepted studies. However, in cases where the geometric mean of growth and reproduction NOAELs exceeded the lowest bounded LOAEL, the Eco-SSL conservatively selected the highest bounded NOAEL below the lowest bounded LOAEL for growth, reproduction, or survival as the preferred TRV. Other endpoints were considered for metals lacking data on growth, reproduction, or survival data.

Avian TRVs were identified for metal COPECs identified in the SLERA, except antimony and beryllium (**Table 7**). Most avian NOAEL TRVs for metals were obtained from the TRVs used by the USEPA to develop Eco-SSLs (**Table 7**); however, avian Eco-SSL TRVs were not available for mercury and thallium. Avian TRVs identified for mercury by Sample et al. (1996b) will be used as representative NOAEL and LOAEL TRVs in the BERA (**Table 7**). For thallium, avian NOAEL and LOAEL endpoints selected in the LANL EcoRisk database for the derivation of ecological screening levels (ESLs) were identified as preliminary TRVs for the BERA. Avian TRVs were not identified in the literature for antimony or beryllium; therefore, potential avian effects related to the estimated dietary exposure of these metals will be addressed as an uncertainty in the BERA.

Mammalian TRVs were selected primarily from TRVs used by the USEPA to develop Eco-SSLs or derived from studies accepted by the USEPA for Eco-SSL derivation (**Table 6**). NOAEL TRVs were selected based on TRVs used in the Eco-SSL derivation for metals, except for aluminum, mercury, and thallium. Consistent with USEPA (2003b), mammalian exposure to aluminum will be evaluated based on soil



conditions, particularly pH, that control the mobility and bioavailability in soils (EHS Support, 2018). The NOAEL TRVs identified for mercury by Sample et al. (1996b) will be used as the representative NOAEL; however, a corresponding mammalian LOAEL was not identified for mercury (**Table 6**). For thallium, NOAEL and LOAEL endpoints were selected from the mammalian study selected in the LANL EcoRisk database (Formigli et al., 1986) for the derivation of ESLs.

Other Inorganics

Avian and mammalian TRVs for cyanide and fluoride were identified based on studies selected for use in calculating ESLs in the LANL EcoRisk Database (LANL, 2017; **Table 6**). For cyanide, an oral dosing study evaluating American kestrel (*Falco sparverius*) survival conducted by Wiemeyer et al. (1986) will be used as the basis for avian TRVs (**Table 6**). A chronic critical life stage study evaluating reproductive effects in rats conducted by Tewe and Maner (1981) will be used as the basis for mammalian TRVs for cyanide. For fluoride, a dietary study of reproductive effects of chronic-critical life stage exposure of Eastern screech owl (*Megascops asio*) conducted by Pattee et al. (1988) will be used as the basis of the avian NOAEL and LOAEL (**Table 6**). A chronic study evaluating potential reproductive effects of dietary fluorine in mink conducted by Aulerich et al. (1997) will be used the basis for the mammalian NOAEL and LOAEL (**Table 6**).

Semi-Volatile Organic Compounds – Polycyclic Aromatic Hydrocarbons

Consistent with USEPA (2007f), dietary exposure to LMW and HMW PAHs will be evaluated as an aggregate dose of each molecular weight group due to the common toxicological properties of PAH compounds within each group.

Avian toxicological studies for LMW and HMW are limited. USEPA (2007f) did not identify a sufficient number of acceptable studies to derive avian Eco-SSLs for either class of PAHs. Of the avian studies accepted by USEPA (2007f), the minimum NOAEL and LOAEL endpoints for growth reported by Trust et al. (1994) were selected as HMW PAH avian TRVs for the BERA (**Table 6**). For avian exposure to LMW PAHs, physiological endpoints from a chronic dietary exposure (7 months) to mallard duck reported by Patton and Dieter (1980) were selected as LMW PAH avian TRVs for the BERA (**Table 6**).

Mammalian NOAELs for LMW and HMW PAHs were selected based on TRVs used by USEPA in the derivation of Eco-SSLs (USEPA, 2007f). The mammalian NOAEL TRV for LMW PAHs was selected as the geometric mean of NOAELs for growth and reproduction endpoints (**Table 6**). The geometric mean of HMW PAH mammalian endpoints for growth and reproduction evaluated in Eco-SSL studies was 18 mg/kg-bw/day; however, the mammalian Eco-SSL for HMW PAH was conservatively derived based on the highest bounded NOAEL below the lowest bounded LOAEL for growth, reproduction, or survival (0.615 mg/kg-bw/day). The TRV of 0.615 mg/kg-bw/day used in the derivation of the mammalian Eco-SSL for HMW PAHs was conservatively selected as the HMW mammalian NOAEL for the BERA. However, given that this NOAEL TRV is two orders of magnitude below the geometric mean of mammalian growth and reproduction NOAELs for HMW PAHs in Eco-SSL studies, further evaluation of mammalian exposure to HMW PAHs in the BERA will include consideration of the range of NOAEL endpoints for growth and survival. Mammalian LOAEL TRVs for LMW and HMW PAHs selected for the BERA are consistent with TechLaw (2008) based on the geometric mean of LOAEL endpoints for growth and reproduction (**Table 6**).



Semi-Volatile Organic Compounds – Non-Polycyclic Aromatic Hydrocarbons

Limited toxicological data are available for the development of TRVs for non-PAH SVOCs. Avian TRVs were identified in the LANL EcoRisk database (LANL, 2017), Sample et al. (1996b), and USEPA (2007g) for 4 of the 12 non-PAH SVOC COPECs, including two of the phthalate ester compounds, bis(2-ethylhexyl) phthalate and di-n-butyl phthalate (**Table 6**). Avian TRVs for di-n-butyl phthalate were selected as surrogate values that will be used to evaluate butyl benzylphthalate and di-n-octyl phthalate (**Table 6**). The avian NOAEL TRV for pentachlorophenol was selected consistent with USEPA (2007g); the LOAEL TRV for pentachlorophenol was estimated as the geometric mean of LOAEL endpoints for growth and reproduction, consistent with TechLaw (2008). No avian TRVs were identified for the remaining non-PAH SVOC COPECs (**Table 6**). Potential avian effects related to the estimated dietary exposure of these non-PAH SVOCs will be addressed as an uncertainty in the BERA.

Literature-based TRVs for mammalian receptors were identified for 7 of the 12 non-PAH SVOCs (**Table 6**). The selection of mammalian TRVs for non-PAH SVOCs was consistent with the value selected by LANL EcoRisk for bis(2-ethylhexyl) phthalate, butyl benzylphthalate, di-n-octyl phthalate, and hexachlorobenzene (**Table 6**). The mammalian NOAEL for pentachlorophenol was selected consistent with USEPA (2007g); the pentachlorophenol LOAEL was estimated as the geometric mean of LOAEL endpoints for growth and reproduction, consistent with TechLaw (2008). NOAEL and LOAEL endpoints reported by Kociba et al. (1977) in a chronic dietary study of Sprague-Dawley rats were selected as NOAEL and LOAEL TRVs for hexachlorobutadiene (**Table 6**). Sufficient information was not identified to develop TRVs for the remaining five SVOCs; mammalian dietary exposure to these non-PAH SVOCs will be addressed as an uncertainty in the BERA.

Dioxin/Furans

Dietary exposure to dioxin/furan compounds will be evaluated based on the potential additive toxicity of dioxin/furan compounds based on the toxicity equivalence methodology (USEPA, 2008a). A dietary dose will be calculated for the 17-individual dioxin/furan compounds in each sample. The EDD for each compound will be multiplied by the compound-specific TEF for birds or mammals to express the dose toxicity equivalence concentration (TEC) to the toxicity of TCDD. TECs of the 17 dioxin/furan compounds will be summed to calculate an overall TEC for comparison with dietary TRVs for 2,3,7,8-TCDD derived for birds and mammals.

Avian and mammalian TRVs for 2,3,7,8-TCDD were selected consistent with Sample et al. (1996b) and the LANL EcoRisk database (LANL, 2017), respectively (**Table 6**). Sample et al. (1996b) identified reproductive NOAEL and LOAEL endpoints (egg production and hatchability) for ring-necked pheasant in a study reported by Nosek et al. (1992). Farmahin (2012, 2013) noted that bird species fall into one of three sensitivity categories (high, medium, and low) for dioxins, with pheasants falling into the middle category. At the request of EPA, a downward adjustment of a factor of 8 (reflecting the difference in sensitivity between bird species in the moderate and highly sensitive categories) was applied to the avian TRV for 2,3,7,8-TCDD. However, as stated in Farmahin (2012), using toxicity data associated with the most sensitive bird species to evaluate dioxins would likely overestimate potential risk of adverse effects, and could lead to inappropriate decisions about remedial options at contaminated sites. The LANL EcoRisk database selected mammalian NOAEL and LOAEL values based on chronic reproductive endpoints from a multi-generational study of Sprague-Dawley rats reported by Murray et al. (1979).



NOAEL and LOAEL TRVs from these sources were selected to evaluate dietary TECs for avian and mammalian receptors of concern in the BERA (**Table 6**).

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Table 1
Summary of Bioaccumulative COPECs for Evaluation in Wildlife Exposure Modeling
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

COPECs	log K _{ow} USEPA EPISUITE	COPECs by Matrix			Bioaccumulative COPEC Lists				Wildlife Ingestion COPEC
		Soil	Sediment	Surface Water	log K _{ow} > 3.5?	USEPA 2017 PBT Constituents	USEPA 2000 Important Bioaccumulative Constituents	USEPA Eco-SSL Wildlife Value	
Metals									
Aluminum	NA	●	●	●	NA			Narrative Statement	Yes
Antimony	NA	●	●		NA			Yes	Yes
Arsenic	NA	●	●		NA		Yes	Yes	Yes
Barium	NA	●	●	●	NA			Yes	Yes
Beryllium	NA	●	●		NA			Yes	Yes
Cadmium	NA	●	●	●	NA		Yes	Yes	Yes
Chromium	NA	●	●		NA		Yes	Yes	Yes
Cobalt	NA	●			NA			Yes	Yes
Copper	NA	●	●	●	NA		Yes	Yes	Yes
Lead	NA	●	●	●	NA	Yes	Yes	Yes	Yes
Manganese	NA	●		●	NA			Yes	Yes
Mercury	NA	●		●	NA	Yes	Yes	Yes	Yes
Nickel	NA	●	●	●	NA		Yes	Yes	Yes
Selenium	NA	●	●		NA		Yes	Yes	Yes
Silver	NA		●		NA		Yes	Yes	Yes
Thallium	NA	●			NA				Yes
Vanadium	NA	●	●		NA			Yes	Yes
Zinc	NA	●	●		NA		Yes	Yes	Yes
Other Inorganics									
Cyanide	NA	●	●	●	NA				Yes
Fluoride	NA	●		●	NA				Yes
Other Inorganics - Essential Nutrients									
Calcium	NA	●	●		NA				
Magnesium	NA	●			NA				
Potassium	NA	●			NA				
Sodium	NA	●			NA				
Polycyclic Aromatic Hydrocarbons (PAHs)									
Total HMW- PAHs	NA	●	●	●	NA	Yes	Yes	Yes	Yes
Total LMW- PAHs	NA	●	●	●	NA	Yes	Yes	Yes	Yes
Dioxin and Dioxin-Like Compounds									
Dioxin and Dioxin-Like Compounds	NA	●			NA	Yes	Yes		Yes
Non-PAH Semi-Volatile Organic Compounds (SVOCs)									
1,2,4,5-Tetrachlorobenzene	4.571	●			Yes		Yes		Yes
1,4-Dioxane	-0.320	●			No				
2,3,4,6-Tetrachlorophenol	4.090		●		Yes				Yes
2,4,5-Trichlorophenol	3.446	●	●		No				
2,4-Dimethylphenol	2.607	●	●		No				
2,4-Dinitrophenol	1.726	●	●		No				
2,4-Dinitrotoluene	2.176	●	●		No				
2,6-Dinitrotoluene	2.176	●	●		No				
2-Chloronaphthalene	3.814	●			Yes				Yes
2-Chlorophenol	2.157	●	●		No				
2-Methylphenol	2.060	●	●		No				
2-Nitrophenol	1.908	●			No				
3- and 4-methylphenol	2.060	●	●		No				
3,3'-Dichlorobenzidine	3.212	●	●		No				
4,6-Dinitro-2-methylphenol	2.273	●			No				
4-Chloroaniline	1.721	●			No				
4-Nitrophenol	1.908	●	●		No				
Acetophenone	1.670		●		No				
Benzaldehyde	1.710	●	●		No				
Bis(2-chloroethoxy)methane	1.295	●			No				
Bis(2-chloroethyl)ether	1.560		●		No				
Bis(2-ethylhexyl)phthalate	8.392	●	●		Yes				Yes
Butylbenzylphthalate	4.845	●			Yes				Yes
Caprolactam	0.660	●			No				
Carbazole	3.230		●		No				
Dibenzofuran	3.715	●	●		Yes				Yes
Di-n-butyl phthalate	4.610	●			Yes				Yes
Di-n-octyl phthalate	8.540	●			Yes				Yes
Hexachlorobenzene	5.860	●	●		Yes	Yes	Yes		Yes
Hexachlorobutadiene	4.717	●	●		Yes		Yes		Yes
Hexachlorocyclopentadiene	4.625	●			Yes		Yes		Yes
Hexachloroethane	4.035	●			Yes		Yes		Yes
Nitrobenzene	1.811	●	●		No				
N-Nitrosodi-n-propylamine	1.326	●			No				
N-Nitrosodiphenylamine	3.161	●			No				
Pentachlorophenol	4.735	●	●		Yes		Yes	Yes	Yes
Phenol	1.513	●	●		No				
Volatile Organic Compounds (VOCs)									
Bromomethane	1.180	●			No				
Cyclohexane	3.180	●			No				

Table 1
Summary of Bioaccumulative COPECs for Evaluation in Wildlife Exposure Modeling
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

COPECs	log K _{ow} USEPA EPISUITE	COPECs by Matrix			Bioaccumulative COPEC Lists				Wildlife Ingestion COPEC
		Soil	Sediment	Surface Water	log K _{ow} > 3.5?	USEPA 2017 PBT Constituents	USEPA 2000 Important Bioaccumulative Constituents	USEPA Eco-SSL Wildlife Value	
Isopropylbenzene	3.450	●			No				
Methylacetate	0.370	●			No				
Methylcyclohexane	3.590	●			Yes				Yes
m,p-Xylene	3.090	●			No				
o-Xylene	3.090	●			No				

Notes:

COPEC, constituent of potential ecological concern

●, COPEC identified in the SLERA

●, COPEC identified in the BERA Work Plan as having a detection in at least one sample and had no associated ecological screening value.

USEPA, United States Environmental Protection Agency

PBT, persistent bioaccumulative toxic

Eco-SSL, ecological soil screening level

NA, not applicable

PAH, polycyclic aromatic hydrocarbons

SVOC, semi-volatile organic compounds

HMW, high molecular weight

LMW, low molecular weight

Table 2
Summary of Exposure Parameters for Wildlife Receptors of Concern
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Columbia Falls, Montana

			Foraging Range ^a	Foraging Range Reference	Body Weight (kg wet weight)			Dietary Composition					Ingestion Rates							
								Plant Material	Invertebrates	Fish	Small Mammals	Dietary Composition Reference	Dietary		Drinking Water		Incidental Substrate			
Common Name	Scientific Name	Food-web classification			Mean	±SD	Body Weight Reference						kg dry weight/day	Reference	L/day	Reference	Average % of Dry Intake	± SD % of Dry Intake	kg dry weight/day	Reference
Avian Receptors																				
American dipper	<i>Cinclus mexicanus</i>	semi-aquatic passerine invertivore	0.32 km	Bakus (1959)	0.0546	0.0048	Dunning (2008)		100%			Ealey (1977)	0.0091	Nagy (2001) ^b	0.0084	Calder and Braun (1983)	2%	---	0.0002	Assumption ^l
American woodcock	<i>Scolopax minor</i>	small soil probing invertivore	11.1 ac	Gregg (1984); USACHPPM (2004)	0.176	---	Dunning (2008)	10%	90%			Sample and Suter (1994)	0.021	Nagy (2001) ^b	0.018	Calder and Braun (1983)	7.5%	6.9%	0.0016	USEPA (2007a)
Belted kingfisher	<i>Ceryle alcyon</i>	small aquatic piscivore	1.03 km	USACHPPM (2004)	0.148	0.0208	Dunning (2008)		10%	90%		Sample and Suter (1994)	0.023	Nagy (2001) ^d	0.016	Calder and Braun (1983)	0%	---	0	Sample and Suter (1994) ^h
Mourning dove	<i>Zenaida macroura</i>	small herbivore	1.6 km	Tomlinson et al. (1960)	0.115	0.0018	Dunning (2008)	100%				USEPA (2005a)	0.013	Nagy (2001) ^c	0.014	Calder and Braun (1983)	6.8%	5.3%	0.00089	USEPA (2007a)
Red-tailed hawk	<i>Buteo jamaicensis</i>	large carnivore	551 ac	Sample and Suter (1994)	1.028	---	Dunning (2008)				100%	Sample and Suter (1994)	0.084	Nagy (2001) ^d	0.060	Calder and Braun (1983)	2.6%	2.3%	0.0022	USEPA (2007a)
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	terrestrial insectivore (Special Status)	42 ac	USFWS (2017a)	0.064	0.0091	Dunning (2008)		100%			USEPA (1993)	0.010	Nagy (2001) ^b	0.0094	Calder and Braun (1983)	0%	---	0	Assumption ⁿ
Mammalian Receptors																				
Canada lynx	<i>Lynx canadensis</i>	medium carnivore (Special Status)	10,625 ac	USFWS (2017b)	6.0	---	USFWS (2017b)				100%	USFWS (2017b)	0.187	Nagy (2001) ^e	0.497	Calder and Braun (1983)	2.8%	0.08%	0.005	Beyer et al. (1994) ^m
Grizzly bear	<i>Ursus arctos horribilis</i>	large carnivore (Special Status)	32,000 ac	USFWS (2007)	90.7	---	USFWS (2007)	65%	15%	10%	10%	USFWS (2007), NPS (2018)	1.959	Nagy (2001) ^e	5.721	Calder and Braun (1983)	2.8%	0.08%	0.055	Beyer et al. (1994) ^m
Long-tailed weasel	<i>Mustela frenata</i>	small carnivore	12 ac	USACHPPM (2004)	0.153	0.003	Brown and Lasiewski (1972), as cited in USACHPPM (2004)				100%	USACHPPM (2004)	0.0079	Nagy (2001) ^e	0.018	Calder and Braun (1983)	1.6%	2.1%	0.0001	USEPA (2007a)
Meadow vole	<i>Microtus pennsylvanicus</i>	small terrestrial herbivore	0.13 ac	McCann (1976) ^k	0.033	0.0082	Brochu et al. (1988), as cited in USEPA (1993)	100%				USACHPPM (2004)	0.0050	Nagy (2001) ^f	0.005	Calder and Braun (1983)	1.3%	1.4%	0.00007	USEPA (2007a)
Mink	<i>Mustela vison</i>	medium semi-aquatic piscivore	1.85 km	Sample and Suter (1994)	0.550	---	Mitchell (1961), as cited in USEPA (1993)			100%		USEPA (1993); Sample and Suter (1994)	0.0238	Nagy (2001) ^e	0.058	Calder and Braun (1983)	0%	---	0	Sample and Suter (1994)
North American Wolverine	<i>Gulo gulo luscus</i>	medium carnivore (Special Status)	26000 ac	Montana Field Guide (2018)	8.0	---	USFWS (2018)				100%	Lofroth et al. (2007)	0.240	Nagy (2001) ^e	0.643	Calder and Braun (1983)	2.8%	0.08%	0.007	Beyer et al. (1994) ^m
Short-tailed shrew	<i>Blarina brevicauda</i>	small terrestrial invertivore	1 ac	Sample and Suter (1994)	0.015	0.00078	Schlessinger and Potter (1974), as cited in Sample and Suter (1994)		100%			Sample and Suter (1994)	0.002	Nagy (2001) ^g	0.002	Calder and Braun (1983)	1.1%	1.5%	0.00002	USEPA (2007a)

Notes:

a, ac, acres; km, kilometers

b, Estimated food ingestion rate (kg/day dry weight) for insectivorous birds = (0.54[Body Weight in grams]^{0.705})/1000 (Nagy 2001);

c, Estimated food ingestion rate (kg/day dry weight) for omnivorous birds = (0.670[Body Weight in grams]^{0.627})/1000 (Nagy 2001);

d, Estimated food ingestion rate (kg/day dry weight) for carnivorous birds = (0.849[Body Weight in grams]^{0.663})/1000 (Nagy 2001);

e, Estimated food ingestion rate (kg/day dry weight) for Carnivora = (0.102[Body Weight in grams]^{0.864})/1000 (Nagy 2001);

f, Estimated food ingestion rate (kg/day dry weight) for Rodentia = (0.332[Body Weight in grams]^{0.774})/1000 (Nagy 2001);

g, Estimated food ingestion rate (kg/day dry weight) for insectivorous mammals = (0.373[Body Weight in grams]^{0.622})/1000 (Nagy 2001);

h, Based on assumption from Sample and Suter 1994 that substrate ingestion is negligible for piscivores;

i, Estimated drinking water ingestion rate for birds = (0.059×[body weight in kg]BW^{0.67}) (Caulder and Braun, 1983)

j, Estimated drinking water ingestion rate for mammals = (0.099×[body weight in kg]BW^{0.90}) (Caulder and Braun, 1983)

k, As cited in the Montana Field Guide, accessed at <http://fieldguide.mt.gov/default.aspx>

l, Literature-based incidental substrate ingestion rate was not identified; assumed limited incidental ingestion based on habitat preference for fast-moving streams with sandy/rocky bottoms.

m, Based on red fox soil ingestion rate assuming the soil ingestion rate of top predators does not exceed the soil ingestion rate of red fox.

SD, standard deviation

Table 3
Estimated Concentrations in Dietary Items of Terrestrial Receptors
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Soil Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	10.0	8.00E-04	8.0E-03	Baes et al. (1984)	5.3E-02	5.3E-01	Sample et al. (1998a)	6.0E-06	6.0E-05	Baes et al. (1984) ^e
Antimony	NA	10.0	Regression ^a	3.42E-01	USEPA (2007a)	1.0E+00	1.0E+01	Assumption ^c	5.0E-02	5.00E-01	Baes et al. (1984) ^e
Arsenic	NA	10.0	3.75E-02	3.8E-01	Bechtel-Jacobs (1998a) ^f	Regression ^d	1.23E+00	Sample et al. (1999)	Regression ^g	5.17E-02	Sample et al. (1998b)
Barium	NA	10.0	1.56E-01	1.6E+00	Bechtel-Jacobs (1998a) ^f	9.100E-02	9.1E-01	Sample et al. (1998a)	6.8E-04	6.83E-03	Baes et al. (1984) ^e
Beryllium	NA	10.0	Regression ^a	3.17E+00	USEPA (2007a)	4.5E-02	4.5E-01	Sample et al. (1998a)	2.3E-03	2.25E-02	Baes et al. (1984) ^e
Cadmium	NA	10.0	Regression ^a	2.19E+00	Bechtel-Jacobs (1998a)	Regression ^d	5.17E+01	Sample et al. (1999)	Regression ^g	8.44E-01	Sample et al. (1998b)
Chromium	NA	10.0	4.10E-02	4.1E-01	Bechtel-Jacobs (1998a) ^f	3.1E-01	3.1E+00	Sample et al. (1998a)	Regression ^g	1.26E+00	Sample et al. (1998b)
Cobalt	NA	10.0	7.50E-03	7.5E-02	Bechtel-Jacobs (1998a) ^f	1.2E-01	1.2E+00	Sample et al. (1998a)	Regression ^g	2.33E-01	Sample et al. (1998b)
Copper	NA	10.0	Regression ^a	1.27E+00	Bechtel-Jacobs (1998a)	5.2E-01	5.2E+00	Sample et al. (1998a)	Regression ^g	1.07E+01	Sample et al. (1998b)
Lead	NA	10.0	Regression ^a	9.64E-01	Bechtel-Jacobs (1998a)	Regression ^d	5.16E+00	Sample et al. (1999)	Regression ^g	2.99E+00	Sample et al. (1998b)
Manganese	NA	10.0	7.90E-02	7.9E-01	Bechtel-Jacobs (1998a) ^f	Regression ^d	2.14E+00	Sample et al. (1999)	2.1E-02	2.1E-01	Sample et al. (1998b) ^k
Mercury	NA	10.0	Regression ^a	1.74E-01	Bechtel-Jacobs (1998a)	3.9E+00	3.9E+01	Sample et al. (1998a)	3.8E-01	3.8E+00	LANL (2015)
Nickel	NA	10.0	Regression ^a	6.06E-01	Bechtel-Jacobs (1998a)	7.8E-01	7.8E+00	Sample et al. (1998a)	Regression ^g	2.28E+00	Sample et al. (1998b)
Selenium	NA	10.0	Regression ^a	6.46E+00	Bechtel-Jacobs (1998a)	Regression ^d	5.02E+00	Sample et al. (1998a)	Regression ^g	1.57E+00	Sample et al. (1998b)
Thallium	NA	10.0	4.00E-03	4.0E-02	Baes et al. (1984)	5.4E-02	5.4E-01	USCHPPM (2004)	1.1E-01	1.08E+00	Baes et al. (1984) ^e
Vanadium	NA	10.0	4.85E-03	4.9E-02	Bechtel-Jacobs (1998a) ^f	4.2E-02	4.2E-01	Sample et al. (1998a)	1.2E-02	1.2E-01	Sample et al. (1998b) ^k
Zinc	NA	10.0	Regression ^a	1.73E+01	Bechtel-Jacobs (1998a)	Regression ^d	1.82E+02	Sample et al. (1998a)	Regression ^g	9.24E+01	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	10.0	0.00E+00	0.0E+00	Lanno and Menzie (2005)	0.00E+00	0.0E+00	Lanno and Menzie (2005)	0.0E+00	0.0E+00	Lanno and Menzie (2005)
Fluoride	NA	10.0	6.00E-02	6.0E-01	Baes et al. (1984)	1.2E-01	1.2E+00	USCHPPM (2004)	1.6E-02	1.6E-01	LANL (2015)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	10.0	Regression ^a	5.4E-04	USEPA (2007a)	1.47E+00	1.47E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Acenaphthylene	4.07	10.0	Regression ^a	2.0E+00	USEPA (2007a)	2.29E+01	2.29E+02	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Anthracene	4.55	10.0	Regression ^a	2.2E+00	USEPA (2007a)	2.42E+00	2.42E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Fluorene	4.18	10.0	Regression ^a	5.4E-04	USEPA (2007a)	9.57E+00	9.57E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Naphthalene	3.36	10.0	1.22E+01	1.2E+02	USEPA (2007a)	4.40E+00	4.40E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Phenanthrene	4.55	10.0	Regression ^a	3.5E+00	USEPA (2007a)	1.72E+00	1.72E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	10.0	Regression ^a	2.6E-01	USEPA (2007a)	1.59E+00	1.59E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Benzo[A]Pyrene	6.11	10.0	Regression ^a	1.2E+00	USEPA (2007a)	1.33E+00	1.33E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Benzo(b)fluoranthene	6.2	10.0	3.10E-01	3.1E+00	USEPA (2007a)	2.60E+00	2.60E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Benzo(g,h,i)perylene	6.7	10.0	Regression ^a	6.0E+00	USEPA (2007a)	2.94E+00	2.94E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Benzo(k)fluoranthene	6.2	10.0	Regression ^a	8.4E-01	USEPA (2007a)	2.60E+00	2.60E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Chrysene	5.7	10.0	Regression ^a	2.6E-01	USEPA (2007a)	2.29E+00	2.29E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Dibenz(a,h)anthracene	6.69	10.0	1.30E-01	1.3E+00	USEPA (2007a)	2.31E+00	2.31E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Fluoranthene	4.95	10.0	5.00E-01	5.0E+00	USEPA (2007a)	3.04E+00	3.04E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Indeno (1,2,3-CD) Pyrene	6.58	10.0	1.10E-01	1.1E+00	USEPA (2007a)	2.86E+00	2.86E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ
Pyrene	4.88	10.0	7.20E-01	7.2E+00	USEPA (2007a)	1.75E+00	1.75E+01	USEPA (2007a)	0.0E+00	0.0E+00	USEPA (2007a) ⁱ

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			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
Bis(2-ethylhexyl)phthalate	8.39	10.0	2.38E-02	2.4E-01	USEPA (2007a)	5.4E+01	5.4E+02	USEPA (2007a)	7.8E-01	7.8E+00	LANL (2015)
Butylbenzylphthalate	4.84	10.0	6.54E-01	6.5E+00	USEPA (2007a)	1.1E+01	1.1E+02	USEPA (2007a)	1.2E-01	1.2E+00	LANL (2015)
Dibenzofuran	3.71	10.0	1.88E+00	1.9E+01	USEPA (2007a)	7.0E+00	7.0E+01	USEPA (2007a)	5.60E-02	5.6E-01	Calculated ^k
Di-n-butyl phthalate	4.61	10.0	8.14E-01	8.1E+00	USEPA (2007a)	1.0E+01	1.0E+02	USEPA (2007a)	4.5E-01	4.5E+00	LANL (2015)
Hexachlorobenzene	5.86	10.0	2.53E-01	2.5E+00	USEPA (2007a)	1.8E+01	1.8E+02	USEPA (2007a)	2.7E+00	2.7E+01	LANL (2015)
Pentachlorophenol	4.74	10.0	5.93E+00	5.9E+01	USEPA (2007a)	1.5E+01	1.5E+02	USEPA (2007a)	Regression ^h	8.6E-01	USEPA (2007a)
1,2,4,5-Tetrachlorobenzene	4.57	10.0	8.44E-01	8.4E+00	USEPA (2007a)	1.0E+01	1.0E+02	USEPA (2007a)	1.3E-01	1.3E+00	Calculated ^k
2-Chloronaphthalene	3.81	10.0	1.71E+00	1.7E+01	USEPA (2007a)	7.3E+00	7.3E+01	USEPA (2007a)	6.3E-02	6.3E-01	Calculated ^k
Di-n-octyl phthalate	8.54	10.0	2.07E-02	2.1E-01	USEPA (2007a)	5.8E+01	5.8E+02	USEPA (2007a)	1.0E+00	1.0E+01	LANL (2015)
Hexachlorobutadiene	4.72	10.0	7.37E-01	7.4E+00	USEPA (2007a)	1.1E+01	1.1E+02	USEPA (2007a)	1.5E-01	1.5E+00	Calculated ^k
Hexachlorocyclopentadiene	4.63	10.0	8.03E-01	8.0E+00	USEPA (2007a)	1.0E+01	1.0E+02	USEPA (2007a)	1.4E-01	1.4E+00	Calculated ^k
Hexachloroethane	4.03	10.0	1.39E+00	1.4E+01	USEPA (2007a)	8.0E+00	8.0E+01	USEPA (2007a)	8.1E-02	8.1E-01	Calculated ^k
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	10.0	2.11E+00	2.1E+01	USEPA (2007a)	6.6E+00	6.6E+01	USEPA (2007a)	7.8E-01	7.8E+00	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	0.000001	9.41E-02	9.4E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.000001	5.17E-02	5.2E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.000001	2.82E-02	2.8E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.000001	2.82E-02	2.8E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.000001	2.82E-02	2.8E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.000001	1.55E-02	1.6E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
OCDD	9.50	0.000001	8.45E-03	8.4E-09	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	Regression ^g	5.7E-07	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.000001	1.69E-01	1.7E-07	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
1,2,3,7,8-PeCDF	6.94	0.000001	9.24E-02	9.2E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
2,3,4,7,8-PeCDF	6.94	0.000001	9.24E-02	9.2E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
1,2,3,4,7,8-HxCDF	7.92	0.000001	3.70E-02	3.7E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
1,2,3,6,7,8-HxCDF	7.92	0.000001	3.70E-02	3.7E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
2,3,4,6,7,8-HxCDF	7.92	0.000001	3.70E-02	3.7E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
1,2,3,7,8,9-HxCDF	7.58	0.000001	5.08E-02	5.1E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
1,2,3,4,6,7,8-HpCDF	8.23	0.000001	2.77E-02	2.8E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
1,2,3,4,7,8,9-HpCDF	8.23	0.000001	2.77E-02	2.8E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j
OCDF	8.87	0.000001	1.52E-02	1.5E-08	USEPA (2007a) ^b	Regression ^d	2.8E-06	Sample et al. (1998a)	1.3E-01	1.3E-07	Sample et al. (1998b) ^j

Table 3
Estimated Concentrations in Dietary Items of Terrestrial Receptors
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

Maximum soil exposure point concentrations are example values to illustrate the calculation of COPEC concentrations in tissue; these values are not representative of exposure concentrations at the Site.

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

g, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.144	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

h, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

i, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

j, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

k, No value was identified in the literature; soil-to-small mammal BAF estimated based on the approach presented in Table 5, consistent with LANL (2017)

Table 4
Estimated Soil to Earthworm Bioaccumulation Factors (BAF) for Non-Ionic Organic Compounds
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	K _{ow} : Octanol to water partitioning coefficient	K _{ww} : worm to soil water partitioning coefficient			K _{oc} : water to soil organic carbon partitioning coefficient ^c				K _d : soil to water partitioning coefficient ^d	Soil to Earthworm BAF ^e
	log K _{ow} ^f	log K _{ww} ^a	K _{ww} wet (L/kg worm ww)	K _{ww} dry (L/kg worm dw) ^b	slope	intercept	log K _{oc}	K _{oc}	K _d (L/kg soil dw)	
Bis(2-ethylhexyl)phthalate	8.39	5.30	2.00E+05	1.25E+06	6.79E-01	6.63E-01	6.36E+00	2.30E+06	2.30E+04	5.44E+01
Butylbenzylphthalate	4.84	2.21	1.64E+02	1.02E+03	6.79E-01	6.63E-01	3.95E+00	8.96E+03	8.96E+01	1.14E+01
Dibenzofuran	3.71	1.23	1.71E+01	1.07E+02	6.79E-01	6.63E-01	3.19E+00	1.53E+03	1.53E+01	6.96E+00
Di-n-butyl phthalate	4.61	2.01	1.02E+02	6.41E+02	6.79E-01	6.63E-01	3.79E+00	6.21E+03	6.21E+01	1.03E+01
Hexachlorobenzene	5.86	3.10	1.25E+03	7.84E+03	6.79E-01	6.63E-01	4.64E+00	4.38E+04	4.38E+02	1.79E+01
Pentachlorophenol	4.74	2.12	1.32E+02	8.23E+02	6.79E-01	6.63E-01	3.88E+00	7.56E+03	7.56E+01	1.09E+01
1,2,4,5-Tetrachlorobenzene	4.57	1.98	9.48E+01	5.92E+02	6.79E-01	6.63E-01	3.77E+00	5.84E+03	5.84E+01	1.01E+01
2-Chloronaphthalene	3.81	1.32	2.08E+01	1.30E+02	6.79E-01	6.63E-01	3.25E+00	1.79E+03	1.79E+01	7.27E+00
Di-n-octyl phthalate	8.54	5.43	2.69E+05	1.68E+06	6.79E-01	6.63E-01	6.46E+00	2.90E+06	2.90E+04	5.81E+01
Hexachlorobutadiene	4.72	2.10	1.27E+02	7.94E+02	6.79E-01	6.63E-01	3.87E+00	7.34E+03	7.34E+01	1.08E+01
Hexachlorocyclopentadiene	4.63	2.02	1.06E+02	6.61E+02	6.79E-01	6.63E-01	3.80E+00	6.36E+03	6.36E+01	1.04E+01
Hexachloroethane	4.03	1.51	3.24E+01	2.02E+02	6.79E-01	6.63E-01	3.40E+00	2.53E+03	2.53E+01	8.01E+00
Methylcyclohexane	3.59	1.12	1.33E+01	8.30E+01	6.79E-01	6.63E-01	3.10E+00	1.26E+03	1.26E+01	6.59E+00

Notes:

a, $\log K_{ww} = 0.87 \cdot \log K_{ow} - 2$ (USEPA, 2007a; Jager, 1998)

b, Converted from wet weight to dry weight assuming 16% solids (USEPA, 2005; Jager, 1998)

c, K_{oc} values modeled based on regression equations from Gerstl (1990), for All Compounds: $\log K_{oc} = A \cdot \log K_{ow} + B$, where A = slope and B = intercept.

d, $K_d = f_{oc} \cdot K_{oc}$, where "foc" is the fraction of organic carbon in soil.

f_{oc} is assumed to be: 0.01

e, $BAF = K_{ww} \text{ (L/kg worm dw)} / K_d \text{ (L/kg soil dw)}$

f, log K_{ow} values obtained from EPI SUITE program, KOWWIN module v 1.69.

BAF, bioaccumulation factor

dw, dry weight

ww, wet weight

Table 5
Estimated Soil to Small Mammal Bioaccumulation Factors (BAF) for Non-Ionic Organic Compounds
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Fat content of beef ^c	BAF _{beef ww} ^b	BAF _{plant ww} ^d	BAF _{invert ww} ^e	BAF _{MAX plant/invert ww} ^f	BAF _{soil-mammal dw} ^a
			d/kg beef _{ww}	mg/kg plant _{ww} per mg COPEC/kg soil _{dw}	mg/kg inv _{ww} per mg COPEC/kg soil _{dw}	mg/kg tissue _{ww} per mg COPEC/kg soil _{dw}	mg/kg flesh _{dw} per mg COPEC/kg soil _{dw}
Dibenzofuran	3.71	19%	2.12E-02	2.82E-01	2.71E+00	2.71E+00	5.60E-02
1,2,4,5-Tetrachlorobenzene	4.57	19%	3.48E-02	1.27E-01	3.95E+00	3.95E+00	1.33E-01
2-Chloronaphthalene	3.81	19%	2.29E-02	2.57E-01	2.83E+00	2.83E+00	6.32E-02
Hexachlorobutadiene	4.72	19%	3.66E-02	1.10E-01	4.22E+00	4.22E+00	1.49E-01
Hexachlorocyclopentadiene	4.63	19%	3.55E-02	1.20E-01	4.05E+00	4.05E+00	1.39E-01
Hexachloroethane	4.03	19%	2.66E-02	2.09E-01	3.12E+00	3.12E+00	8.07E-02
Methylcyclohexane	3.59	19%	1.92E-02	3.17E-01	2.57E+00	2.57E+00	4.82E-02

Notes:

a, BAF_{soil-mammal} model based on LANL (2015) equation for Transfer Factor from soil to dry weight flesh (TF_{flesh_dw}):

$$BAF_{soil-mammal} = BAF_{beef} \times \left[\frac{(FIR_{MAX} \times BAF_{MAX plant/invert} + SIR_{MAX})}{(1-MC)} \right]$$

where:

BAF_{soil-mammal dw} = Soil-to-small mammal BAF (kg soil, dw/kg flesh, _{dw})
BAF_{beef ww} = Diet-to-beef transfer factor (d/kg beef_{ww})
FIR_{MAX ww} = Maximum food ingestion rate for LANL prey species (0.305 kg food_{ww}/d; LANL, 2015)
BAF_{MAX Plant/Invert} = Maximum BAF for plant or invertebrate dietary items of the prey species (kg soil_{dw}/kg tissue_{ww})
SIR_{MAX} = Maximum incidental soil ingestion rate for LANL prey species (0.0193 kg soil_{dw}/d; LANL, 2015)
MC = Moisture content of flesh (assumed 68 percent per LANL, 2015)

b, Diet-to-beef transfer factor calculated based on RTI (2005), consistent with LANL (2017):

$$\text{Log}BAF_{beef ww} = \text{Fat}_{beef} \times (-0.099 \times \log K_{ow}^2 + 1.07 \times \log Kow - 3.56)$$

where:

BAF_{beef ww} = Diet-to-beef transfer factor (d/kg beef_{ww})
Fat_{beef ww} = Fat content of beef; assumed to be 19 percent or 0.19 based on LANL (2017)
K_{ow} = Octanol-water partitioning coefficient

c, Assumed fat content of beef of 19 percent consistent with LANL (2017)

d, BAF_{plant ww}, Soil-to-plant bioaccumulation factor calculated on wet weight basis by multiplying the plant BAF in Table 3 by 1-moisture content of plant leaves (1 - 0.85 = 0.15 per LANL, 2017).

e, BAF_{invert ww}, Soil-to-invertebrate bioaccumulation factor calculated on wet weight basis by multiplying the plant BAF in Table 3 by 1-moisture content in soil invertebrates (1 - 0.61 = 0.39; LANL, 2017).

f, Maximum soil-to-tissue BAF between higher of the BAF_{plant ww} and BAF_{invert ww}

BAF, bioaccumulation factor

dw, dry weight

ww, wet weight

Table 6
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Metals												
Aluminum	NA	0.01	10.0	NA	7.40E-02	---	7.40E-01	Stanley et al. (2010)	---	9.24E+02	9.24E+00	Sample et al. (1996b)
Antimony	NA	0.01	10.0	NA	5.75E-01	---	5.75E+00	Dovick et al. (2015)	---	4.00E+00	4.00E-02	Sample et al. (1996b)
Arsenic	NA	0.01	10.0	NA	3.73E-01	---	3.73E+00	Bechtel-Jacobs (1998b) ^c	---	6.80E+01	6.80E-01	Sample et al. (1996b)
Barium	NA	0.01	10.0	NA	2.82E+00	---	2.82E+01	Hamilton et al. (2002)	---	2.98E+02	2.98E+00	Nakamoto and Hassler (1992)
Beryllium	NA	0.01	10.0	NA	1.67E-01	---	1.67E+00	Hamilton et al. (2002)	---	7.60E+01	7.60E-01	Sample et al. (1996)
Cadmium	NA	0.01	10.0	NA	4.59E-01	---	4.59E+00	Bechtel-Jacobs (1998b) ^c	---	4.96E+04	4.96E+02	Sample et al. (1996b)
Chromium	NA	0.01	10.0	NA	8.30E-02	---	8.30E-01	Bechtel-Jacobs (1998b) ^c	---	1.20E+01	1.20E-01	Sample et al. (1996b)
Copper	NA	0.01	10.0	NA	6.61E-01	---	6.61E+00	Bechtel-Jacobs (1998b) ^c	---	1.16E+03	1.16E+01	Sample et al. (1996b)
Lead	NA	0.01	10.0	NA	8.00E-02	---	8.00E-01	Bechtel-Jacobs (1998b) ^c	---	1.80E+02	1.80E+00	Sample et al. (1996b)
Nickel	NA	0.01	10.0	NA	1.34E-01	---	1.34E+00	Bechtel-Jacobs (1998b) ^c	---	4.2E+02	4.2E+00	Sample et al. (1996b)
Selenium	NA	0.01	10.0	NA	3.75E+00	---	3.75E+01	Hamilton et al. (2002)	---	1.0E+04	1.0E+02	Sample et al. (1996b)
Silver	NA	0.01	10.0	NA	1.80E-01	---	1.80E+00	Hirsch (1998)	---	4.2E+02	4.2E+00	Garnier-Laplace et al. (1992)
Thallium	NA	0.01	10.0	NA	2.00E-02	---	2.00E-01	Turner et al. (2013)	---	1.36E+02	1.36E+00	Sample et al. (1996b)
Vanadium	NA	0.01	10.0	NA	2.50E-01	---	2.50E+00	Hamilton et al. (2002)	---	2.52E+03	2.52E+01	CECBP (2008)
Zinc	NA	0.01	10.0	NA	8.40E-01	---	8.40E+00	Bechtel-Jacobs (1998b) ^c	---	3.9E+03	3.86E+01	Sample et al. (1996b)
Inorganics - Other Inorganics												
Cyanide	NA	0.01	10.0	NA	0.0E+00	0.0E+00	0.0E+00	Lanno and Menzie (2005)	0.0E+00	0.0E+00	0.0E+00	Lanno and Menzie (2005)
Fluoride	NA	0.01	10.0	NA	---	Regression	2.43E+01	Derived based on Aquirre-Sierra et al. (2013)	---	Regression	1.92E+01	Derived based on Shi et al. (2009)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	4.01	0.001	0.1	0.704	4.58E+00	---	4.58E-01	DiToro and McGrath (2000)	5.63E+00	---	5.63E-01	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.001	0.1	0.754	4.90E+00	---	4.90E-01	DiToro and McGrath (2000)	6.04E+00	---	6.04E-01	DiToro and McGrath (2000)
Anthracene	4.53	0.001	0.1	0.673	4.37E+00	---	4.37E-01	DiToro and McGrath (2000)	5.38E+00	---	5.38E-01	DiToro and McGrath (2000)
Fluorene	4.21	0.001	0.1	0.692	4.50E+00	---	4.50E-01	DiToro and McGrath (2000)	5.53E+00	---	5.53E-01	DiToro and McGrath (2000)
Naphthalene	3.36	0.001	0.1	0.745	4.84E+00	---	4.84E-01	DiToro and McGrath (2000)	5.96E+00	---	5.96E-01	DiToro and McGrath (2000)
Phenanthrene	4.57	0.001	0.1	0.670	4.36E+00	---	4.36E-01	DiToro and McGrath (2000)	5.36E+00	---	5.36E-01	DiToro and McGrath (2000)
Total LMW PAHs							2.76E+00				3.39E+00	
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	6.71	0.001	0.1	0.556	3.61E+00	---	3.61E-01	DiToro and McGrath (2000)	4.45E+00	---	4.45E-01	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.001	0.1	0.586	3.81E+00	---	3.81E-01	DiToro and McGrath (2000)	4.69E+00	---	4.69E-01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.001	0.1	0.578	3.76E+00	---	3.76E-01	DiToro and McGrath (2000)	4.62E+00	---	4.62E-01	DiToro and McGrath (2000)

Table 6
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation
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Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Benzo(g,h,i)perylene	6.51	0.001	0.1	0.566	3.68E+00	---	3.68E-01	DiToro and McGrath (2000)	4.53E+00	---	4.53E-01	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.001	0.1	0.577	3.75E+00	---	3.75E-01	DiToro and McGrath (2000)	4.61E+00	---	4.61E-01	DiToro and McGrath (2000)
Chrysene	5.71	0.001	0.1	0.607	3.94E+00	---	3.94E-01	DiToro and McGrath (2000)	4.85E+00	---	4.85E-01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.001	0.1	0.556	3.61E+00	---	3.61E-01	DiToro and McGrath (2000)	4.45E+00	---	4.45E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.001	0.1	0.641	4.17E+00	---	4.17E-01	DiToro and McGrath (2000)	5.13E+00	---	5.13E-01	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.001	0.1	0.555	3.61E+00	---	3.61E-01	DiToro and McGrath (2000)	4.44E+00	---	4.44E-01	DiToro and McGrath (2000)
Pyrene	4.92	0.001	0.1	0.650	4.23E+00	---	4.23E-01	DiToro and McGrath (2000)	5.20E+00	---	5.20E-01	DiToro and McGrath (2000)
Total HMW PAHs							3.82E+00				4.70E+00	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
2,3,4,6-Tetrachlorophenol	4.09	0.001	0.1	0.699	4.54E+00	---	4.54E-01	DiToro and McGrath (2000)	5.59E+00	---	5.59E-01	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.001	0.1	0.716	4.66E+00	---	4.66E-01	DiToro and McGrath (2000)	5.73E+00	---	5.73E-01	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.001	0.1	0.480	3.12E+00	---	3.12E-01	DiToro and McGrath (2000)	3.84E+00	---	3.84E-01	DiToro and McGrath (2000)
Dibenzofuran	3.71	0.001	0.1	0.723	4.70E+00	---	4.70E-01	DiToro and McGrath (2000)	5.78E+00	---	5.78E-01	DiToro and McGrath (2000)
Di-n-octyl phthalate	4.61	0.001	0.1	0.668	4.34E+00	---	4.34E-01	DiToro and McGrath (2000)	5.34E+00	---	5.34E-01	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.001	0.1	0.599	3.89E+00	---	3.89E-01	DiToro and McGrath (2000)	4.79E+00	---	4.79E-01	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.001	0.1	0.662	4.30E+00	---	4.30E-01	DiToro and McGrath (2000)	5.29E+00	---	5.29E-01	DiToro and McGrath (2000)
Pentachlorophenol	4.74	0.001	0.1	0.661	4.30E+00	---	4.30E-01	DiToro and McGrath (2000)	5.29E+00	---	5.29E-01	DiToro and McGrath (2000)

Notes:

Maximum exposure point concentrations are example values to illustrate the calculation of COPEC concentrations in tissue; these values are not representative of exposure concentrations at the Site.

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1.0%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

BCF, bioconcentration factor

BSAF, biota-sediment accumulation factor

kg OC/kg lipid, kilogram organic carbon per kilogram lipid

Table 7
Avian and Mammalian Toxicity Reference Values
Draft Technical Memorandum: Proposed Wildlife Exposure Modeling Approach
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analytes	Avian Receptors				Mammalian Receptors			
	Chronic TRV _{Low} ^a	Chronic TRV _{High} ^b	Test Animal	Source	Chronic TRV _{Low} ^a	Chronic TRV _{High} ^b	Test Animal	Source
	(mg/kg-bw/d)				(mg/kg-bw/d)			
Metals								
Aluminum	110	1100	Ringed dove	Carriere et al. (1986); as cited in LANL EcoRisk	Narrative	Narrative	---	USEPA (2003b)
Antimony	NA	NA	--	--	0.059	2.76	geometric mean	USEPA (2005b); TechLaw (2008)
Arsenic	2.24	4.51	geometric mean	USEPA (2005c); TechLaw (2008)	1.04	4.55	geometric mean	USEPA (2005c); TechLaw (2008)
Barium	73.5	131	geometric mean	LANL (2003)	51.8	82.7	geometric mean	USEPA (2005d); TechLaw (2008)
Beryllium	NA	NA	--	--	0.532	0.67	geometric mean	USEPA (2005e); TechLaw (2008)
Cadmium	1.47	6.35	geometric Mean	USEPA (2005f); TechLaw (2008)	0.77	6.87	geometric mean	USEPA (2005f); TechLaw (2008)
Chromium	2.66	15.6	geometric mean	USEPA (2008b); TechLaw (2008)	2.4	58.2	geometric mean	USEPA (2008b); TechLaw (2008)
Cobalt	7.61	20.16	geometric mean	USEPA (2005g); TechLaw (2008)	7.33	18.9	geometric mean	USEPA (2005g); TechLaw (2008)
Copper	4.05	34.8	geometric mean	USEPA (2007b); TechLaw (2008)	5.6	82.7	geometric mean	USEPA (2007b); TechLaw (2008)
Lead	1.63	44.6	geometric mean	USEPA (2005h); TechLaw (2008)	4.7	186.4	geometric mean	USEPA (2005h); TechLaw (2008)
Manganese	179	377	geometric mean	USEPA (2007c); TechLaw (2008)	51.5	146	geometric mean	USEPA (2007c); TechLaw (2008)
Mercury	0.45	0.91	Japanese quail	Hill and Schaffer (1976), as cited in Sample et al. (1996b)	1	NA	mink	Aulerich et al. (1974), as cited in Sample et al. (1996b)
Nickel	6.71	18.6	geometric mean	USEPA (2007d); TechLaw (2008)	1.7	14.8	geometric mean	USEPA (2007d); TechLaw (2008)
Selenium	0.3	0.82	geometric mean	USEPA (2007e); TechLaw (2008)	0.143	0.66	geometric mean	USEPA (2007e); TechLaw (2008)
Silver	2.02	60.5	geometric mean	USEPA (2006); TechLaw (2008)	6.02	119	geometric mean	USEPA (2006); TechLaw (2008)
Thallium	0.35	3.5	starling	Schafer (1972), as cited in LANL EcoRisk	0.48	1.43	rat	Engineering Field Activity West (1998)
Vanadium	0.344	1.7	geometric mean	USEPA (2005i) TechLaw (2008)	4.16	9.44	geometric mean	USEPA (2005i) TechLaw (2008)
Zinc	66.1	171	geometric mean	USEPA (2007e); TechLaw (2008)	75.4	298	geometric mean	USEPA (2007e); TechLaw (2008)
Inorganics - Other Inorganics								
Cyanide	0.04	0.4	American kestrel	Wiemeyer et al. (1986), as cited in LANL EcoRisk	68.7	687	rat	Tewe and Manner (1981), as cited in LANL EcoRisk
Fluoride	12.2	122	Eastern screech owl	Pattee et al. (1988), as cited in LANL EcoRisk	26.6	49	mink	Aulerich et al. (1987), as cited in LANL EcoRisk
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Total LMW PAHs	16.1	161	mallard	Patton and Dieter 1980	65.6	356	geometric mean	USEPA (2007g); TechLaw (2008)
Total HMW PAHs	2	20	European starling	Trust et al. (1994), as cited in USEPA (2007g)	0.615	38.4	geometric mean	USEPA (2007g); TechLaw (2008)
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene	No TRV	No TRV	---	---	No TRV	No TRV	---	---
2,3,4,6-Tetrachlorophenol	No TRV	No TRV	---	---	No TRV	No TRV	---	---
2-Chloronaphthalene	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Bis(2-ethylhexyl)phthalate	1.1	11	Ringed dove	Sample et al. (1996b), as cited in LANL EcoRisk	18.3	183	mouse	Sample et al. (1996b), as cited in LANL EcoRisk
Butylbenzylphthalate	0.11 ^c	1.1 ^c	Ringed dove	Sample et al. (1996b)	159	1590	rat	NTP (1985), as cited in LANL EcoRisk
Dibenzofuran	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Di-n-butyl phthalate	0.11	1.1	Ringed dove	Sample et al. (1996b)	550	1833	mouse	Sample et al. (1996b)
Di-n-octyl phthalate	0.11 ^c	1.1 ^c	Ringed dove	Sample et al. (1996b)	65.1	651	mouse	IT Corporation (1997), as cited in LANL (2017)
Hexachlorobenzene	5	50	Japanese quail	Carpenter et al. (1985), as cited in LANL EcoRisk	7.1	71	Deer mouse	Schafer et al. (1985), as cited in LANL EcoRisk
Hexachlorobutadiene	No TRV	No TRV	---	---	200	2000	Rat	Kociba et al. (1977), as cited in USEPA (1999)

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Columbia Falls Aluminum Company
Columbia Falls, Montana

Analytes	Avian Receptors				Mammalian Receptors			
	Chronic TRV _{Low} ^a	Chronic TRV _{High} ^b	Test Animal	Source	Chronic TRV _{Low} ^a	Chronic TRV _{High} ^b	Test Animal	Source
	(mg/kg-bw/d)				(mg/kg-bw/d)			
Hexachlorocyclopentadiene	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Hexachloroethane	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Pentachlorophenol	6.73	52	geometric mean	USEPA (2007h); TechLaw (2008)	8.42	22.7	geometric mean	USEPA (2007h); TechLaw (2008)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Dioxin/Furans								
2,3,7,8-TCDD	0.00000175	0.0000175	chicken	Sample et al (1996); Farmahin et al. (2012) ^e	0.000000562	0.00000376	geometric mean	Murray et al. (1979), as cited in LANL EcoRisk

Notes:

a, NOAEL is no observable adverse effects level.

b, LOAEL is low observable adverse effects level.

c, Aroclor 1254 used as a surrogate for Aroclor 1248 for both birds and mammals.

d, Di-n-butyl phthalate used as a surrogate for avian exposure to phthalates.

e, TRV based on the NOAEL for a ring-necked pheasant, divided by 8 based on the higher sensitivity of AHR1-dependent changes in gene expression of chickens and chicken-like birds, per Farmahin et al. (2012).

---, Appropriate data are not available from published literature to derive NOAEL and LOAEL values.

NA, Toxicity Reference Value not available.

bw/d, body weight per day.

TRV, toxicity reference value.



Appendix B Screening-Level COPEC Identification Tables

Table B-1
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	152	152	5540	12606	51200	50	152	1024	Yes	[Maximum] > ESV
Antimony	7440-36-0	152	9	0.31	0.44	0.61	0.142	9	4.3	Yes	[Maximum] > ESV
Arsenic	7440-38-2	152	152	1.60	4.4	8.8	5.7	18	1.5	Yes	[Maximum] > ESV
Barium	7440-39-3	152	152	32.6	106.1	392	1.04	152	376.9	Yes	[Maximum] > ESV
Beryllium	7440-41-7	152	152	0.16	0.46	0.96	1.06	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	152	19	0.29	0.56	1.7	0.00222	19	765.8	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	154	154	5.30	11.8	80.8	23	9	3.5	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	154	150	0.14	0.31	2.16	0.34	20	6.4	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	154	154	5.09	11.53	78.64	23	8	3.4	Yes	[Maximum] > ESV
Cobalt	7440-48-4	152	152	2.80	5.1	9.6	0.14	152	68.6	Yes	[Maximum] > ESV
Copper	7440-50-8	152	152	5.60	14.9	52.6	5.4	152	9.7	Yes	[Maximum] > ESV
Iron	7439-89-6	152	152	6170	13337	21500	NESV	0	---	Yes	No ESV Available
Lead	7439-92-1	152	152	2.90	13.7	57.7	0.0537	152	1074.5	Yes	[Maximum] > ESV
Manganese	7439-96-5	152	152	161	411	1270	220	147	5.8	Yes	[Maximum] > ESV
Mercury	7439-97-6	152	130	0.0094	0.0228	0.27	0.1	1	2.7	Yes	[Maximum] > ESV
Nickel	7440-02-0	152	152	6.30	17.9	140	10	124	14	Yes	[Maximum] > ESV
Selenium	7782-49-2	152	9	0.32	0.47	0.66	0.0276	9	23.9	Yes	[Maximum] > ESV
Silver	7440-22-4	152	2	0.96	0.97	0.99	2	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	152	1	0.13	0.13	0.13	0.05	1	2.6	Yes	[Maximum] > ESV
Vanadium	7440-62-2	152	152	4.10	11.5	31.8	1.59	152	20	Yes	[Maximum] > ESV
Zinc	7440-66-6	152	152	22.2	50.4	244	6.62	152	36.9	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	152	126	0.017	0.153	2.4	0.098	48	24.5	Yes	[Maximum] > ESV
Fluoride	16984-48-8	152	152	1.55	60.69	571	120	19	4.8	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	152	152	1430	21052	81500	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	152	152	4610	9739	27500	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	152	152	324	802	1580	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	152	108	26.5	198.3	4750	NESV	---	---	Yes	Essential Nutrient
Dioxins and Furans (mg/kg)											
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	58	41	2.60E-07	9.23E-06	6.97E-05	NESV	---	---	Yes	No ESV Available
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	58	52	5.80E-07	4.53E-05	6.04E-04	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	58	10	4.10E-08	1.20E-06	4.13E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	58	41	4.30E-08	1.20E-06	9.63E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	39227-28-6	58	19	3.70E-08	1.14E-06	4.07E-06	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	58	40	4.40E-08	6.12E-07	4.00E-06	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	57653-85-7	58	40	7.50E-08	2.27E-06	1.92E-05	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	58	2	5.20E-08	6.40E-08	7.70E-08	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	19408-74-3	58	45	6.10E-08	1.29E-06	9.54E-06	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	58	17	1.10E-07	8.60E-07	2.84E-06	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	40321-76-4	58	29	2.80E-08	3.18E-07	1.53E-06	NESV	---	---	Yes	No ESV Available
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	58	30	3.10E-08	6.15E-07	4.58E-06	NESV	---	---	Yes	No ESV Available
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	58	33	5.60E-08	5.83E-07	3.65E-06	NESV	---	---	Yes	No ESV Available

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Main Plant Area
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Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	58	33	4.80E-08	1.22E-06	6.15E-06	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1746-01-6	58	15	5.10E-08	1.74E-07	5.80E-07	NESV	---	---	Yes	No ESV Available
Octachlorodibenzofuran	39001-02-0	58	44	9.30E-07	2.07E-05	1.90E-04	NESV	---	---	Yes	No ESV Available
Octachlorodibenzo-P-Dioxin	3268-87-9	58	55	3.02E-06	4.44E-04	6.76E-03	NESV	---	---	Yes	No ESV Available
TEC _{2,3,7,8-TCDD-Bird-1/2MDL}	--	58	57	6.55E-08	1.86E-06	1.18E-05	2.08E-07	43	56.7	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-MDL}	--	58	57	1.34E-07	2.25E-06	1.23E-05	2.08E-07	52	59.4	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-Zero}	--	58	57	4.40E-09	1.73E-06	1.18E-05	2.08E-07	40	56.6	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-1/2MDL}	--	58	57	4.72E-08	1.56E-06	1.55E-05	2.90E-07	39	53.5	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-MDL}	--	58	57	1.02E-07	1.80E-06	1.56E-05	2.90E-07	45	53.8	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-Zero}	--	58	57	4.40E-09	1.46E-06	1.55E-05	2.90E-07	38	53.4	Yes	[Maximum] > ESV
Pesticides (mg/kg)											
Aldrin	309-00-2	18	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	18	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	18	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	18	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	18	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	18	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	18	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	18	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	18	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	18	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	18	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	18	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	18	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	18	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	18	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	18	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	18	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	18	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	18	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	18	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	18	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	136	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	136	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	136	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	136	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	136	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	136	4	0.056	0.073	0.11	0.041	4	2.7	Yes	[Maximum] > ESV
PCB-1260 (Aroclor 1260)	11096-82-5	136	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	136	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	136	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	136	4	0.056	0.073	0.11	0.000332	4	331.3	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											

Table B-1
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2-Methylnaphthalene	91-57-6	152	66	0.0017	0.1313	1.7	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	152	112	0.0026	0.4436	15	0.25	26	60	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	152	18	0.0018	0.018	0.055	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	152	99	0.002	0.983	22	6.8	4	3.2	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	152	145	0.0021	5.807	170	10	19	17	Yes	[Maximum] > ESV
Fluorene	86-73-7	152	106	0.0018	0.3234	10	3.7	1	2.7	Yes	[Maximum] > ESV
Naphthalene	91-20-3	152	84	0.0017	0.2584	4	0.0994	28	40.2	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	152	143	0.0027	3.4346	120	5.5	22	21.8	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	--	152	145	0.00795	10.67521	341.63	29	12	11.8	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	--	152	145	0.0138	10.6946	341.86	29	12	11.8	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	--	152	145	0.0021	10.6558	341.4	29	12	11.8	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	152	143	0.0015	3.9527	130	1.52	41	85.5	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	152	134	0.0013	3.6711	110	0.73	47	150.7	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	152	145	0.002	5.044	150	18	9	8.3	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	152	139	0.0015	3.8796	99	25	4	4	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	152	130	0.0023	2.2358	68	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	152	145	0.0015	4.35	130	3.1	28	41.9	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	152	112	0.0017	1.1401	28	14	1	2	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	152	137	0.0029	3.7306	100	71	1	1.4	Yes	[Maximum] > ESV
Pyrene	129-00-0	152	144	0.0017	6.4281	220	10	19	22	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	--	152	145	0.01205	33.20223	1035	1.1	103	940.9	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	--	152	145	0.0146	33.2071	1035	1.1	103	940.9	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	--	152	145	0.0095	33.1973	1035	1.1	103	940.9	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	152	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	152	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	152	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	152	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	152	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	152	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	152	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	152	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	152	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	152	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	152	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	152	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	152	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	152	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	152	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	120	4	0.011	0.023	0.036	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	152	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	152	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	152	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	152	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-1
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
4-Chloro-3-Methylphenol	59-50-7	152	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	152	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	152	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	152	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	152	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	152	5	0.0024	0.0152	0.046	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	152	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	152	6	0.0049	0.0302	0.093	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	152	30	0.013	0.516	5.6	0.239	9	23.4	Yes	[Maximum] > ESV
Biphenyl (Diphenyl)	92-52-4	152	10	0.0017	0.0498	0.14	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	152	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	152	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	152	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	152	47	0.016	0.268	5.8	0.02	44	290	Yes	[Maximum] > ESV
Caprolactam	105-60-2	152	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	152	116	0.0046	0.7384	17	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	152	84	0.0017	0.2202	4.8	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	152	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	152	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	152	21	0.013	0.038	0.19	0.011	21	17.3	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	152	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	152	1	0.091	0.091	0.091	0.079	1	1.2	Yes	[Maximum] > ESV
Hexachlorobutadiene	87-68-3	152	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	152	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	152	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	152	9	0.0099	0.8181	3.3	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	152	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	152	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	152	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	151	4	0.17	0.32	0.53	0.119	4	4.5	Yes	[Maximum] > ESV
Phenol	108-95-2	152	1	0.021	0.021	0.021	0.79	0	<1	No	[Maximum] < ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	64	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	64	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	64	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	64	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	64	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	64	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	64	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	64	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	64	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	64	0	---	---	---	1.23	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	64	0	---	---	---	0.92	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	64	1	0.00014	0.00014	0.00014	0.85	0	<1	No	[Maximum] < ESV

Table B-1
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2-Dichloropropane	78-87-5	64	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	64	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	64	0	---	---	---	0.546	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	64	1	0.0012	0.0012	0.0012	0.36	0	<1	No	[Maximum] < ESV
Acetone	67-64-1	64	62	0.0055	0.0307	0.11	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	64	45	0.00019	0.00049	0.0013	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	64	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	64	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	64	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	64	1	0.0011	0.0011	0.0011	0.235	0	<1	No	[Maximum] < ESV
Carbon Disulfide	75-15-0	64	36	0.00038	0.00113	0.0028	0.0941	0	<1	No	[Maximum] < ESV
Carbon Tetrachloride	56-23-5	64	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	64	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	64	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	64	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	64	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	64	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	64	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	64	17	0.00039	0.0011	0.0055	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	64	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	64	0	---	---	---	39.5	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	64	17	0.00017	0.00041	0.0011	5.16	0	<1	No	[Maximum] < ESV
Isopropylbenzene (Cumene)	98-82-8	64	1	0.0003	0.0003	0.0003	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	64	12	0.0016	0.033	0.32	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	64	25	0.0012	0.0039	0.014	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	64	1	0.0043	0.0043	0.0043	9.7	0	<1	No	[Maximum] < ESV
Methylcyclohexane	108-87-2	64	29	0.00045	0.00128	0.0076	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	64	3	0.00068	0.00183	0.0027	2.6	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	64	1	0.0003	0.0003	0.0003	1.2	0	<1	No	[Maximum] < ESV
Tert-Butyl Methyl Ether	1634-04-4	64	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	64	1	0.00033	0.00033	0.00033	0.18	0	<1	No	[Maximum] < ESV
Toluene	108-88-3	64	53	0.00016	0.00107	0.012	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	64	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	64	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	64	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	64	0	---	---	---	16.4	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	64	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	64	41	0.000091	0.000652	0.0042	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	64	20	0.00015	0.00058	0.0051	NESV	---	---	Yes	No ESV Available
Total Xylene - 1/2MDL	--	64	41	0.000156	0.000975	0.0093	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	--	64	41	0.000221	0.001014	0.0093	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	--	64	41	0.000091	0.000936	0.0093	1.4	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH (s.u.)	---	34	34	6.13	7.34	8.72	NESV	---	---	---	---

Table B-1
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Total Organic Carbon	7440440	44	43	82.3	14895.8	47000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table B-2
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum		110	110	4500	13702	36800	50	110	736	Yes	[Maximum] > ESV
Antimony	7440-36-0	110	4	0.37	0.91	1.5	0.142	4	10.6	Yes	[Maximum] > ESV
Arsenic	7440-38-2	110	110	2.8	6.2	17.9	5.7	53	3.1	Yes	[Maximum] > ESV
Barium	7440-39-3	110	110	40.7	133.5	436	1.04	110	419.2	Yes	[Maximum] > ESV
Beryllium	7440-41-7	110	108	0.24	0.6	4.7	1.06	3	4.4	Yes	[Maximum] > ESV
Cadmium	7440-43-9	110	5	0.27	0.77	1.6	0.00222	5	720.7	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	118	117	2.4	11	84.8	23	1	3.7	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	118	110	0.06	0.29	2.27	0.34	18	6.7	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	118	117	2.34	10.7	82.53	23	1	3.6	Yes	[Maximum] > ESV
Cobalt	7440-48-4	110	110	1.5	5.7	13	0.14	110	92.9	Yes	[Maximum] > ESV
Copper	7440-50-8	110	110	5.9	81	7260	5.4	110	1344.4	Yes	[Maximum] > ESV
Iron	7439-89-6	110	110	2940	14944	37100	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	110	110	5.9	12.9	63.7	0.0537	110	1186.2	Yes	[Maximum] > ESV
Manganese	7439-96-5	110	110	129	455	1140	220	106	5.2	Yes	[Maximum] > ESV
Mercury	7439-97-6	110	89	0.01	0.02	0.08	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	110	110	4.9	23.8	534	10	96	53.4	Yes	[Maximum] > ESV
Selenium	7782-49-2	110	16	0.34	0.83	3	0.0276	16	108.7	Yes	[Maximum] > ESV
Silver	7440-22-4	110	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	110	16	0.11	0.25	1.1	0.05	16	22	Yes	[Maximum] > ESV
Vanadium	7440-62-2	110	110	3	14	151	1.59	110	95	Yes	[Maximum] > ESV
Zinc	7440-66-6	110	110	28.7	49.5	114	6.62	110	17.2	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	110	75	0.016	0.576	13	0.098	40	132.7	Yes	[Maximum] > ESV
Fluoride	16984-48-8	110	110	3.24	60.9	796	120	10	6.6	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	110	110	921	29670	313000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	110	110	2890	10283	18800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	110	110	332	1095	10900	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	110	76	33	370	5170	NESV	---	---	Yes	Essential Nutrient
Dioxins and Furans (mg/kg)											
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	4	2	5.13E-06	5.25E-06	5.37E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	4	4	1.38E-06	2.84E-05	7.63E-05	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	4	2	1.06E-06	1.36E-06	1.67E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	39227-28-6	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	4	4	1.70E-07	4.40E-07	7.80E-07	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	57653-85-7	4	3	3.00E-07	1.50E-06	2.50E-06	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	19408-74-3	4	2	7.00E-07	9.00E-07	1.10E-06	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	40321-76-4	4	2	7.30E-08	1.96E-07	3.20E-07	NESV	---	---	Yes	No ESV Available
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	4	1	5.70E-07	5.70E-07	5.70E-07	NESV	---	---	Yes	No ESV Available
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	4	3	1.10E-07	4.50E-07	9.50E-07	NESV	---	---	Yes	No ESV Available

Table B-2
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	4	3	4.60E-07	9.80E-07	1.78E-06	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1746-01-6	4	1	2.70E-07	2.70E-07	2.70E-07	NESV	---	---	Yes	No ESV Available
Octachlorodibenzofuran	39001-02-0	4	2	7.31E-06	1.21E-05	1.68E-05	NESV	---	---	Yes	No ESV Available
Octachlorodibenzo-P-Dioxin	3268-87-9	4	4	8.87E-06	3.04E-04	8.91E-04	NESV	---	---	Yes	No ESV Available
TEC _{2,3,7,8-TCDD-Bird-1/2MDL}	---	4	4	1.61E-07	1.60E-06	3.67E-06	2.08E-07	3	17.6	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-MDL}	---	4	4	6.29E-07	2.21E-06	4.39E-06	2.08E-07	4	21.1	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-Zero}	---	4	4	2.03E-08	1.51E-06	3.60E-06	2.08E-07	3	17.3	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-1/2MDL}	---	4	4	1.38E-07	1.11E-06	1.90E-06	2.90E-07	3	6.6	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-MDL}	---	4	4	5.77E-07	1.69E-06	2.75E-06	2.90E-07	4	9.5	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-Zero}	---	4	4	3.45E-08	1.03E-06	1.83E-06	2.90E-07	3	6.3	Yes	[Maximum] > ESV
Pesticides (mg/kg)											
Aldrin	309-00-2	10	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	10	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	10	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	10	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	10	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	10	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	10	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	9	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	10	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	10	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	10	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	10	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	10	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	10	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	10	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	10	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	10	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	10	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	10	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	10	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	10	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	70	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	70	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	70	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	70	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	70	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	70	6	0.062	0.472	1.2	0.041	6	29.3	Yes	[Maximum] > ESV
PCB-1260 (Aroclor 1260)	11096-82-5	70	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	70	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	70	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	70	6	0.062	0.472	1.2	0.000332	6	3614.5	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2-Methylnaphthalene	91-57-6	110	27	0.0016	0.2564	3.9	3.24	1	1.2	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	110	68	0.0022	0.8178	28	0.25	6	112	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	110	7	0.0015	0.2242	1	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	110	72	0.002	1.471	48	6.8	2	7.1	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	110	108	0.01	5.6	240	10	5	24	Yes	[Maximum] > ESV
Fluorene	86-73-7	110	69	0.0014	0.6958	25	3.7	2	6.8	Yes	[Maximum] > ESV
Naphthalene	91-20-3	110	47	0.0014	0.3476	10	0.0994	5	100.6	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	110	106	0.0052	4.4839	240	5.5	5	43.6	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	110	108	0.02055	12.18888	595.9	29	3	20.5	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	110	108	0.0256	12.2059	595.9	29	3	20.5	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	110	108	0.0155	12.1719	595.9	29	3	20.5	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	110	105	0.0057	2.4132	100	1.52	9	65.8	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	110	102	0.005	2.571	100	0.73	14	137	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	110	106	0.0093	3.4379	120	18	4	6.7	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	110	102	0.0051	1.9895	62	25	2	2.5	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	110	98	0.0027	1.3951	50	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	110	109	0.007	3.353	110	3.1	7	35.5	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	110	89	0.0016	0.7165	21	14	2	1.5	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	110	101	0.0031	2.1718	76	71	1	1.1	Yes	[Maximum] > ESV
Pyrene	129-00-0	110	105	0.0083	3.718	150	10	5	15	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	110	109	0.0477	20.7267	789	1.1	61	717.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	110	109	0.0485	20.7321	789	1.1	62	717.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	110	109	0.011	20.721	789	1.1	61	717.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	110	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	110	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	110	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	110	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	110	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	110	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	110	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	110	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	110	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	110	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	110	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	110	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	110	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	110	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	110	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	54	4	0.012	0.271	1	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	110	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	110	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	110	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	110	0	---	---	---	NESV	---	---	No	100% Non-Detect

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
4-Chloro-3-Methylphenol	59-50-7	110	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	110	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	110	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	110	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	110	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	110	6	0.0022	0.0064	0.019	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	110	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	110	10	0.0049	0.0171	0.082	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	110	7	0.013	0.198	0.98	0.239	1	4.1	Yes	[Maximum] > ESV
Biphenyl (Diphenyl)	92-52-4	110	3	0.0035	0.0147	0.035	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	110	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	110	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	110	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	110	14	0.025	0.252	2.5	0.02	14	125	Yes	[Maximum] > ESV
Caprolactam	105-60-2	110	2	0.039	0.052	0.066	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	110	92	0.0017	0.7162	32	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	110	52	0.0016	0.5221	15	6.1	2	2.5	Yes	[Maximum] > ESV
Diethyl Phthalate	84-66-2	110	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	110	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	110	6	0.013	0.033	0.056	0.011	6	5.1	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	110	2	0.096	0.353	0.61	0.91	0	<1	No	[Maximum] < ESV
Hexachlorobenzene	118-74-1	110	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	110	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	110	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	110	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	110	14	0.011	0.151	1.4	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	110	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	110	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	110	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	110	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	110	4	0.016	0.349	1.2	0.79	1	1.5	Yes	[Maximum] > ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	27	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	27	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	27	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	27	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	27	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	27	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	27	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	27	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	27	0	---	---	---	1.23	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	27	0	---	---	---	0.92	---	---	No	100% Non-Detect

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2-Dichloroethane	107-06-2	27	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	27	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	27	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	27	0	---	---	---	0.546	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	27	0	---	---	---	0.36	---	---	No	100% Non-Detect
Acetone	67-64-1	27	25	0.0079	0.0296	0.13	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	27	12	0.00017	0.00108	0.0097	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	27	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	27	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	27	1	0.00045	0.00045	0.00045	0.235	0	<1	No	[Maximum] < ESV
Carbon Disulfide	75-15-0	27	13	0.00039	0.0016	0.0041	0.0941	0	<1	No	[Maximum] < ESV
Carbon Tetrachloride	56-23-5	27	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	27	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	27	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	27	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	27	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	27	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	27	1	0.00052	0.00052	0.00052	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	27	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	27	0	---	---	---	39.5	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	27	1	0.0024	0.0024	0.0024	5.16	0	<1	No	[Maximum] < ESV
Isopropylbenzene (Cumene)	98-82-8	27	1	0.00034	0.00034	0.00034	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	27	7	0.0028	0.0088	0.017	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	27	6	0.0009	0.0032	0.012	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	27	0	---	---	---	9.7	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	27	5	0.00042	0.00067	0.001	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	27	1	0.00056	0.00056	0.00056	2.6	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	27	0	---	---	---	1.2	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	27	1	0.00034	0.00034	0.00034	0.18	0	<1	No	[Maximum] < ESV
Toluene	108-88-3	27	22	0.00015	0.00091	0.012	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	27	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	27	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	27	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	27	0	---	---	---	16.4	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	27	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	27	10	0.00012	0.00063	0.0038	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	27	2	0.00022	0.00091	0.0016	NESV	---	---	Yes	No ESV Available
Total Xylene - 1/2MDL	1330-20-7	27	10	0.000185	0.000874	0.0054	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	27	10	0.00025	0.00093	0.0054	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	1330-20-7	27	10	0.00012	0.00082	0.0054	1.4	0	<1	No	[Maximum] < ESV

Table B-2
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Physicochemical Parameters											
Moisture, Percent	---	24	24	3.4	12.2	62.5	NESV	---	---	---	---
pH (s.u.)	---	78	78	4.99	7.01	8.13	NESV	---	---	---	---
Total Organic Carbon	7440440	66	61	2280	20280	137000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table B-3
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Industrial Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	12	12	9030	28891	117000	50	12	2340	Yes	[Maximum] > ESV
Antimony	7440-36-0	12	5	0.32	1.4	2.9	0.142	5	20.4	Yes	[Maximum] > ESV
Arsenic	7440-38-2	12	12	4	9	24	5.7	7	4.1	Yes	[Maximum] > ESV
Barium	7440-39-3	12	12	49.7	122.1	234	1.04	12	225	Yes	[Maximum] > ESV
Beryllium	7440-41-7	12	12	0.3	1.8	7.7	1.06	3	7.3	Yes	[Maximum] > ESV
Cadmium	7440-43-9	12	4	0.36	0.88	1.5	0.00222	4	675.7	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	12	12	8.4	14.4	39.2	23	1	1.7	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	12	12	0.25	0.39	1.05	0.34	5	3.1	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	12	12	8.18	14.03	38.15	23	1	1.7	Yes	[Maximum] > ESV
Cobalt	7440-48-4	12	12	3.4	7.4	16	0.14	12	114.3	Yes	[Maximum] > ESV
Copper	7440-50-8	12	12	11.3	83	776	5.4	12	143.7	Yes	[Maximum] > ESV
Iron	7439-89-6	12	12	6400	15067	20600	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	12	12	7.6	13.2	19.4	0.0537	12	361.3	Yes	[Maximum] > ESV
Manganese	7439-96-5	12	12	137	379	606	220	11	2.8	Yes	[Maximum] > ESV
Mercury	7439-97-6	12	9	0.012	0.017	0.022	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	12	12	11.7	105.4	513	10	12	51.3	Yes	[Maximum] > ESV
Selenium	7782-49-2	12	4	0.37	0.47	0.75	0.0276	4	27.2	Yes	[Maximum] > ESV
Silver	7440-22-4	12	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	12	4	0.13	0.16	0.19	0.05	4	3.8	Yes	[Maximum] > ESV
Vanadium	7440-62-2	12	12	7	43	169	1.59	12	106.3	Yes	[Maximum] > ESV
Zinc	7440-66-6	12	12	36.9	51.9	67	6.62	12	10.1	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	12	3	0.14	0.18	0.22	0.098	3	2.2	Yes	[Maximum] > ESV
Fluoride	16984-48-8	12	12	1.37	149.14	810	120	3	6.8	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	12	12	2880	30595	52500	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	12	12	4950	10570	14100	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	12	12	492	1797	6760	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	12	11	38.3	11037.4	61300	NESV	---	---	Yes	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	12	8	0.0055	0.0972	0.41	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	12	12	0.0028	0.6883	3.4	0.25	5	13.6	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	12	0	---	---	---	120	---	---	No	100% Non-Detect
Anthracene	120-12-7	12	12	0.0057	0.9915	6.4	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	12	12	0.096	11.407	71	10	4	7.1	Yes	[Maximum] > ESV
Fluorene	86-73-7	12	12	0.0018	0.3615	2.7	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	12	9	0.0077	0.2589	1.8	0.0994	3	18.1	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	12	12	0.044	5.409	40	5.5	2	7.3	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	12	12	0.1526	19.1	125.7	29	2	4.3	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	12	12	0.1548	19.1	125.8	29	2	4.3	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	12	12	0.1503	19.1	125.7	29	2	4.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	12	12	0.067	9.452	53	1.52	7	34.9	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	12	12	0.054	7.621	43	0.73	8	58.9	Yes	[Maximum] > ESV

Table B-3
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Industrial Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Benzo(B)Fluoranthene	205-99-2	12	12	0.077	10.525	60	18	2	3.3	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	12	12	0.064	8.908	43	25	1	1.7	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	12	12	0.036	4.645	24	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	12	12	0.067	8.807	51	3.1	5	16.5	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	12	12	0.013	1.997	11	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	12	12	0.05	6.91	36	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	12	12	0.1	11.1	67	10	4	6.7	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	12	12	0.528	69.988	388	1.1	11	352.7	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	12	12	0.528	69.988	388	1.1	11	352.7	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	12	12	0.528	69.988	388	1.1	11	352.7	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	12	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	12	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	12	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	12	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	12	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	12	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	12	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	12	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	12	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	12	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	12	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	12	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	12	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	12	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	12	0	---	---	---	1.6	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	12	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	12	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	12	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	12	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	12	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	12	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	12	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	12	0	---	---	---	300	---	---	No	100% Non-Detect
Atrazine	1912-24-9	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzyl Butyl Phthalate	85-68-7	12	0	---	---	---	0.239	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	12	1	0.11	0.11	0.11	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	12	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	12	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	12	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	12	0	---	---	---	0.02	---	---	No	100% Non-Detect

Table B-3
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Industrial Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Caprolactam	105-60-2	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	12	12	0.0095	0.9967	7.1	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	12	11	0.0019	0.1907	1.3	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	12	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	12	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	12	0	---	---	---	0.011	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	12	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	12	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	12	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	12	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	12	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	12	0	---	---	---	139	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	12	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	12	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	12	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	12	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	12	0	---	---	---	0.79	---	---	No	100% Non-Detect
Physicochemical Parameters											
Moisture, Percent	---	12	12	4.9	9	19.6	NESV	---	---	---	---
pH (s.u.)	---	12	12	6.57	7.26	8.04	NESV	---	---	---	---
Total Organic Carbon	7440440	12	12	3070	12870	20700	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-4
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	37	37	5350	16218	30300	50	37	606	Yes	[Maximum] > ESV
Antimony	7440-36-0	37	0	---	---	---	0.142	---	---	No	100% Non-Detect
Arsenic	7440-38-2	37	37	2	5	12	5.7	14	2.2	Yes	[Maximum] > ESV
Barium	7440-39-3	37	37	45.3	371.3	1060	1.04	37	1019.2	Yes	[Maximum] > ESV
Beryllium	7440-41-7	37	37	0.23	0.52	0.87	1.06	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	37	6	0.38	0.59	0.7	0.00222	6	315.3	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	37	37	5.6	8.3	15.8	23	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	37	37	0.15	0.22	0.42	0.34	1	1.2	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	37	37	5.4	8	15.4	23	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	37	37	3	5	7	0.14	37	52.1	Yes	[Maximum] > ESV
Copper	7440-50-8	37	37	4.7	11.1	25.5	5.4	36	4.7	Yes	[Maximum] > ESV
Iron	7439-89-6	37	37	8490	12383	21800	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	37	37	4.5	13.4	36.2	0.0537	37	674.1	Yes	[Maximum] > ESV
Manganese	7439-96-5	37	37	169	818	3950	220	35	18	Yes	[Maximum] > ESV
Mercury	7439-97-6	37	34	0.011	0.028	0.12	0.1	1	1.2	Yes	[Maximum] > ESV
Nickel	7440-02-0	37	37	7.4	18.3	68.9	10	28	6.9	Yes	[Maximum] > ESV
Selenium	7782-49-2	37	2	0.52	0.58	0.64	0.0276	2	23.2	Yes	[Maximum] > ESV
Silver	7440-22-4	37	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	37	7	0.11	0.13	0.15	0.05	7	3	Yes	[Maximum] > ESV
Vanadium	7440-62-2	37	37	4.9	12.3	25.7	1.59	37	16.2	Yes	[Maximum] > ESV
Zinc	7440-66-6	37	37	25.3	58.9	150	6.62	37	22.7	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	37	21	0.06	0.23	0.64	0.098	17	6.5	Yes	[Maximum] > ESV
Fluoride	16984-48-8	37	37	0.69	16.15	61.4	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	37	37	1620	11273	54100	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	37	37	2700	7718	15500	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	37	37	327	1057	2070	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	37	26	38.2	93.1	189	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	7	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	7	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	7	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	7	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	7	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	7	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	7	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	7	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	7	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	7	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	7	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	7	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	7	0	---	---	---	0.005	---	---	No	100% Non-Detect

Table B-4
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor	76-44-8	7	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	7	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	7	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	7	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	7	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	7	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	7	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	7	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	7	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	7	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	7	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	7	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	7	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	7	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	7	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	7	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	7	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	7	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	37	6	0.0031	0.0085	0.014	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	37	23	0.0024	0.0175	0.11	0.25	0	<1	No	[Maximum] < ESV
Acenaphthylene	208-96-8	37	3	0.0069	0.0117	0.021	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	37	25	0.0019	0.0376	0.21	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	37	37	0.0035	0.3528	2.8	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	37	23	0.0018	0.0103	0.038	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	37	16	0.0016	0.006	0.025	0.0994	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	37	36	0.0045	0.1495	1.1	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	37	37	0.00935	0.56586	4.371	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	37	37	0.0152	0.5858	4.522	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	37	37	0.0035	0.5459	4.22	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	37	37	0.0026	0.2573	1.9	1.52	1	1.3	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	37	35	0.0023	0.1813	1.5	0.73	2	2.1	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	37	37	0.0041	0.6119	4.5	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	37	37	0.0035	0.3768	3.1	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	37	36	0.0047	0.2022	1.6	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	37	37	0.0028	0.3565	2.8	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	37	28	0.0049	0.0992	0.62	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	37	37	0.0026	0.3268	2.5	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	37	37	0.0047	0.3476	2.9	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	37	37	0.02445	2.72233	21.42	1.1	17	19.5	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	37	37	0.0263	2.7244	21.42	1.1	17	19.5	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	37	37	0.0226	2.7203	21.42	1.1	17	19.5	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											

Table B-4
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2,4,5-Tetrachlorobenzene	95-94-3	37	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	37	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	37	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	37	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	37	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	37	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	37	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	37	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	37	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	37	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	37	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	37	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	37	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	37	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	37	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	7	2	0.01	0.04	0.07	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	37	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	37	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	37	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	37	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	37	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	37	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	37	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	37	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	37	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	37	13	0.0022	0.0061	0.024	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	37	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	37	14	0.0048	0.0129	0.06	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	37	0	---	---	---	0.239	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	37	2	0.0036	0.0038	0.0041	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	37	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	37	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	37	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	37	8	0.016	0.091	0.15	0.02	7	7.5	Yes	[Maximum] > ESV
Caprolactam	105-60-2	37	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	37	30	0.0027	0.0523	0.37	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	37	21	0.002	0.007	0.028	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	37	2	0.012	0.028	0.044	24.8	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	37	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	37	1	0.22	0.22	0.22	0.011	1	20	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	37	1	0.027	0.027	0.027	0.91	0	<1	No	[Maximum] < ESV
Hexachlorobenzene	118-74-1	37	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	37	0	---	---	---	0.0398	---	---	No	100% Non-Detect

Table B-4
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Hexachlorocyclopentadiene	77-47-4	37	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	37	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	37	0	---	---	---	139	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	37	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	37	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	37	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	37	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	37	0	---	---	---	0.79	---	---	No	100% Non-Detect
Physicochemical Parameters											
pH (s.u.)	---	30	30	5.74	6.75	8.2	NESV	---	---	---	---
Total Organic Carbon	7440440	30	30	9370	41521	187000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-5
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	54	54	6230	15154	29400	50	54	588	Yes	[Maximum] > ESV
Antimony	7440-36-0	54	0	---	---	---	0.142	---	---	No	100% Non-Detect
Arsenic	7440-38-2	54	54	2.4	6	15.3	5.7	27	2.7	Yes	[Maximum] > ESV
Barium	7440-39-3	54	54	57.9	208.7	482	1.04	54	463.5	Yes	[Maximum] > ESV
Beryllium	7440-41-7	54	52	0.26	0.55	0.97	1.06	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	54	2	0.3	0.3	0.4	0.00222	2	175.7	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	54	54	4.4	9.6	13.5	23	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	54	54	0.12	0.26	0.36	0.34	3	1.1	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	54	54	4.28	9.31	13.14	23	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	54	54	2.7	5.5	8.6	0.14	54	61.4	Yes	[Maximum] > ESV
Copper	7440-50-8	54	54	3.5	12.9	26.7	5.4	52	4.9	Yes	[Maximum] > ESV
Iron	7439-89-6	54	54	6880	15309	23400	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	54	54	7	12	22	0.0537	54	406	Yes	[Maximum] > ESV
Manganese	7439-96-5	54	54	175	586	2620	220	52	11.9	Yes	[Maximum] > ESV
Mercury	7439-97-6	54	43	0.0098	0.0255	0.055	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	54	54	5.1	12.3	35.7	10	43	3.6	Yes	[Maximum] > ESV
Selenium	7782-49-2	54	8	0.26	0.38	0.5	0.0276	8	18.1	Yes	[Maximum] > ESV
Silver	7440-22-4	54	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	54	3	0.11	0.14	0.19	0.05	3	3.8	Yes	[Maximum] > ESV
Vanadium	7440-62-2	54	54	4.6	11.6	20.4	1.59	54	12.8	Yes	[Maximum] > ESV
Zinc	7440-66-6	54	54	30.5	54.9	116	6.62	54	17.5	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	54	26	0.042	0.153	0.42	0.098	16	4.3	Yes	[Maximum] > ESV
Fluoride	16984-48-8	54	53	1.12	8.37	37.8	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	54	54	1120	11984	170000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	54	54	3280	8571	14800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	54	54	400	942	1620	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	54	36	34.3	58.1	168	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	2	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	2	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	2	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	2	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	2	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	2	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	2	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	2	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	2	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	2	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	2	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	2	0	---	---	---	0.005	---	---	No	100% Non-Detect

Table B-5
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor	76-44-8	2	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	2	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	2	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	2	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	2	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	2	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	2	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	2	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	8	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	8	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	8	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	8	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	8	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	8	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	54	7	0.0018	0.0043	0.0064	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	54	21	0.0022	0.0074	0.024	0.25	0	<1	No	[Maximum] < ESV
Acenaphthylene	208-96-8	54	0	---	---	---	120	---	---	No	100% Non-Detect
Anthracene	120-12-7	54	26	0.0021	0.0099	0.046	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	54	48	0.0021	0.0784	0.55	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	54	23	0.0018	0.0052	0.016	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	54	21	0.0015	0.0077	0.049	0.0994	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	54	46	0.0025	0.04	0.21	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	54	49	0.0082	0.1377	0.8633	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	54	49	0.0143	0.1462	0.8687	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	54	49	0.0021	0.1291	0.858	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	54	47	0.0021	0.0603	0.47	1.52	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	54	45	0.0015	0.0468	0.4	0.73	0	<1	No	[Maximum] < ESV
Benzo(B)Fluoranthene	205-99-2	54	49	0.0018	0.1048	0.9	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	54	47	0.0023	0.0678	0.53	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	54	41	0.0029	0.0386	0.22	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	54	48	0.0017	0.0764	0.59	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	54	32	0.0028	0.0206	0.12	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	54	45	0.0016	0.0563	0.4	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	54	48	0.0017	0.0766	0.51	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	54	49	0.01105	0.52283	4.14	1.1	6	3.8	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	54	49	0.0153	0.5277	4.14	1.1	6	3.8	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	54	49	0.0068	0.518	4.14	1.1	6	3.8	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											

Table B-5
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2,4,5-Tetrachlorobenzene	95-94-3	54	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	54	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	54	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	54	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	54	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	54	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	54	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	54	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	54	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	54	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	54	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	54	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	54	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	54	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	54	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	54	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	54	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	54	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	54	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	54	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	54	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	54	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	54	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	54	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	54	13	0.0019	0.0035	0.0066	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	54	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	54	15	0.0052	0.0099	0.018	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	54	3	0.028	0.04	0.047	0.239	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	54	5	0.0033	0.004	0.0053	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	54	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	54	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	54	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	54	21	0.043	0.159	0.66	0.02	21	33	Yes	[Maximum] > ESV
Caprolactam	105-60-2	54	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	54	31	0.0018	0.0113	0.048	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	54	16	0.0016	0.0052	0.013	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	54	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	54	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	54	0	---	---	---	0.011	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	54	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	54	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	54	0	---	---	---	0.0398	---	---	No	100% Non-Detect

Table B-5
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Hexachlorocyclopentadiene	77-47-4	54	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	54	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	54	3	0.002	0.008	0.013	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	54	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	54	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	54	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	54	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	54	0	---	---	---	0.79	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	4	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	4	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	4	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	4	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	4	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	4	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	4	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	4	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	4	0	---	---	---	1.23	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	4	0	---	---	---	0.92	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	4	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	4	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	4	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	4	0	---	---	---	0.546	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	4	0	---	---	---	0.36	---	---	No	100% Non-Detect
Acetone	67-64-1	4	4	0.0091	0.04	0.071	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	4	1	0.00041	0.00041	0.00041	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	4	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	4	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	4	0	---	---	---	0.235	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	4	1	0.00035	0.00035	0.00035	0.0941	0	<1	No	[Maximum] < ESV
Carbon Tetrachloride	56-23-5	4	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	4	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	4	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	4	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	4	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	4	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibromochloromethane	124-48-1	4	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	4	0	---	---	---	39.5	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	4	0	---	---	---	5.16	---	---	No	100% Non-Detect

Table B-5
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Isopropylbenzene (Cumene)	98-82-8	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	4	3	0.0019	0.0926	0.27	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	4	2	0.0018	0.0026	0.0034	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	4	0	---	---	---	9.7	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methylene Chloride	75-09-2	4	0	---	---	---	2.6	---	---	No	100% Non-Detect
Styrene	100-42-5	4	0	---	---	---	1.2	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	4	0	---	---	---	0.18	---	---	No	100% Non-Detect
Toluene	108-88-3	4	1	0.00064	0.00064	0.00064	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	4	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	4	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	4	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	4	0	---	---	---	16.4	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	4	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
O-Xylene (1,2-Dimethylbenzene)	95-47-6	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Total Xylene - 1/2MDL	1330-20-7	4	0	---	---	---	1.4	---	---	No	100% Non-Detect
Total Xylene - MDL	1330-20-7	4	0	---	---	---	1.4	---	---	No	100% Non-Detect
Total Xylene - Zero	1330-20-7	4	0	---	---	---	1.4	---	---	No	100% Non-Detect
Physicochemical Parameters											
pH (s.u.)	---	46	46	5.08	6.32	8.13	NESV	---	---	---	---
Total Organic Carbon	7440440	50	50	1240	20796	97700	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-6
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	82	82	5230	17154	30900	50	82	618	Yes	[Maximum] > ESV
Antimony	7440-36-0	82	1	0.36	0.36	0.36	0.142	1	2.5	Yes	[Maximum] > ESV
Arsenic	7440-38-2	82	82	2	5	16	5.7	25	2.8	Yes	[Maximum] > ESV
Barium	7440-39-3	82	82	74.5	248.7	533	1.04	82	512.5	Yes	[Maximum] > ESV
Beryllium	7440-41-7	82	81	0.21	0.65	1.2	1.06	3	1.1	Yes	[Maximum] > ESV
Cadmium	7440-43-9	82	3	0.48	0.64	0.78	0.00222	3	351.4	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	82	82	4	11	21	23	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	82	82	0.11	0.29	0.56	0.34	23	1.6	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	82	82	3.89	10.58	20.34	23	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	82	82	2.2	5.5	7.4	0.14	82	52.9	Yes	[Maximum] > ESV
Copper	7440-50-8	82	82	6.6	15.6	33.2	5.4	82	6.1	Yes	[Maximum] > ESV
Iron	7439-89-6	82	82	5720	14693	21100	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	82	82	4.3	12.4	44.8	0.0537	82	834.3	Yes	[Maximum] > ESV
Manganese	7439-96-5	82	82	36.1	426.8	2210	220	65	10	Yes	[Maximum] > ESV
Mercury	7439-97-6	82	58	0.012	0.025	0.063	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	82	82	4.2	11	17.4	10	63	1.7	Yes	[Maximum] > ESV
Selenium	7782-49-2	82	23	0.29	0.62	1.1	0.0276	23	39.9	Yes	[Maximum] > ESV
Silver	7440-22-4	82	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	82	3	0.12	0.22	0.41	0.05	3	8.2	Yes	[Maximum] > ESV
Vanadium	7440-62-2	82	82	4	12	21	1.59	82	13.5	Yes	[Maximum] > ESV
Zinc	7440-66-6	82	82	10.1	51.1	238	6.62	82	36	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	82	55	0.022	0.183	2.2	0.098	33	22.4	Yes	[Maximum] > ESV
Fluoride	16984-48-8	82	82	0.31	5.43	19.6	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	82	82	988	9876	177000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	82	82	2110	7831	18300	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	82	82	335	931	1530	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	82	67	29.8	109.9	555	NESV	---	---	Yes	Essential Nutrient
Dioxins and Furans (mg/kg)											
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	20	4	8.60E-07	1.19E-06	2.03E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	20	13	4.50E-07	3.31E-06	6.36E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	20	4	7.50E-08	3.06E-07	8.00E-07	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	39227-28-6	20	1	1.07E-06	1.07E-06	1.07E-06	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	20	10	9.70E-08	2.34E-07	7.60E-07	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	57653-85-7	20	3	2.90E-07	5.70E-07	1.11E-06	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	19408-74-3	20	7	2.60E-07	4.50E-07	1.29E-06	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	40321-76-4	20	10	4.50E-08	1.16E-07	3.10E-07	NESV	---	---	Yes	No ESV Available
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	20	3	1.00E-07	4.00E-07	9.00E-07	NESV	---	---	Yes	No ESV Available
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	20	4	6.90E-08	1.33E-07	2.80E-07	NESV	---	---	Yes	No ESV Available

Table B-6
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Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1746-01-6	20	4	6.80E-08	6.15E-07	1.84E-06	NESV	---	---	Yes	No ESV Available
Octachlorodibenzofuran	39001-02-0	20	6	1.22E-06	3.07E-06	7.38E-06	NESV	---	---	Yes	No ESV Available
Octachlorodibenzo-P-Dioxin	3268-87-9	20	15	3.74E-06	1.78E-05	3.35E-05	NESV	---	---	Yes	No ESV Available
TEC _{2,3,7,8-TCDD-Bird-1/2MDL}	---	20	17	9.96E-08	3.92E-07	2.03E-06	2.08E-07	8	9.8	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-MDL}	---	20	17	5.21E-07	1.10E-06	3.05E-06	2.08E-07	17	14.7	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-Zero}	---	20	17	2.73E-09	3.02E-07	1.84E-06	2.08E-07	5	8.8	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-1/2MDL}	---	20	17	7.24E-08	3.79E-07	1.95E-06	2.90E-07	5	6.7	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-MDL}	---	20	17	3.43E-07	7.27E-07	2.18E-06	2.90E-07	17	7.5	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-Zero}	---	20	17	8.62E-09	3.18E-07	1.84E-06	2.90E-07	4	6.3	Yes	[Maximum] > ESV
Pesticides (mg/kg)											
Aldrin	309-00-2	13	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	13	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	13	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	13	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	13	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	13	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	13	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	13	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	13	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	13	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	13	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	13	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	13	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	13	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	13	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	13	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	13	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	13	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	13	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	13	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	13	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	30	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	30	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	30	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	30	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	30	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	30	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	30	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	30	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	30	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	30	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2-Methylnaphthalene	91-57-6	82	12	0.0019	0.0093	0.023	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	82	19	0.0024	0.0083	0.018	0.25	0	<1	No	[Maximum] < ESV
Acenaphthylene	208-96-8	82	0	---	---	---	120	---	---	No	100% Non-Detect
Anthracene	120-12-7	82	23	0.0022	0.0095	0.031	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	82	53	0.0022	0.0669	0.41	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	82	23	0.0015	0.0053	0.014	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	82	19	0.0015	0.0051	0.013	0.0994	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	82	55	0.002	0.034	0.16	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	82	62	0.008	0.114	0.64	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	82	62	0.014	0.13	0.643	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	82	62	0.002	0.099	0.636	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	82	49	0.002	0.046	0.27	1.52	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	82	45	0.0017	0.0395	0.2	0.73	0	<1	No	[Maximum] < ESV
Benzo(B)Fluoranthene	205-99-2	82	53	0.003	0.076	0.52	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	82	45	0.002	0.054	0.28	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	82	41	0.0022	0.0336	0.19	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	82	54	0.0021	0.0559	0.37	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	82	25	0.0022	0.018	0.059	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	82	43	0.0015	0.0487	0.3	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	82	50	0.0024	0.0698	0.38	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	82	54	0.0144	0.3992	2.499	1.1	5	2.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	82	54	0.0179	0.411	2.499	1.1	5	2.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	82	54	0.0109	0.3874	2.499	1.1	5	2.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	82	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	82	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	82	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	82	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	82	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	82	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	82	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	82	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	82	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	82	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	82	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	82	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	82	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	82	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	82	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	30	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	82	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	82	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	82	0	---	---	---	0.144	---	---	No	100% Non-Detect

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
4-Bromophenyl Phenyl Ether	101-55-3	82	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	82	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	82	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	82	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	82	1	0.0059	0.0059	0.0059	21.9	0	<1	No	[Maximum] < ESV
4-Nitrophenol	100-02-7	82	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	82	8	0.0022	0.0065	0.025	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	82	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	82	10	0.0052	0.0106	0.044	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	82	4	0.034	0.046	0.074	0.239	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	82	11	0.0023	0.0079	0.046	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	82	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	82	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	82	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	82	13	0.016	0.132	0.35	0.02	12	17.5	Yes	[Maximum] > ESV
Caprolactam	105-60-2	82	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	82	34	0.0019	0.01	0.037	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	82	16	0.0018	0.0048	0.0087	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	82	1	0.032	0.032	0.032	24.8	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	82	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	82	4	0.011	0.129	0.48	0.011	3	43.6	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	82	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	82	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	82	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	82	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	82	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	82	0	---	---	---	139	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	82	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	82	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	82	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	82	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	82	0	---	---	---	0.79	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	17	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	17	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	17	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	17	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	17	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	17	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	17	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	17	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	17	0	---	---	---	1.23	---	---	No	100% Non-Detect

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2-Dichlorobenzene	95-50-1	17	0	---	---	---	0.92	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	17	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	17	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	17	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	17	0	---	---	---	0.546	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	17	0	---	---	---	0.36	---	---	No	100% Non-Detect
Acetone	67-64-1	17	17	0.0094	0.0557	0.17	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	17	9	0.00029	0.00075	0.0015	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	17	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	17	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	17	0	---	---	---	0.235	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	17	0	---	---	---	0.0941	---	---	No	100% Non-Detect
Carbon Tetrachloride	56-23-5	17	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	17	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	17	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	17	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	17	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	17	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	17	1	0.001	0.001	0.001	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	17	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	17	0	---	---	---	39.5	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	17	0	---	---	---	5.16	---	---	No	100% Non-Detect
Isopropylbenzene (Cumene)	98-82-8	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	17	10	0.002	0.08	0.4	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	17	5	0.0022	0.0049	0.009	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	17	0	---	---	---	9.7	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	17	1	0.0015	0.0015	0.0015	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	17	0	---	---	---	2.6	---	---	No	100% Non-Detect
Styrene	100-42-5	17	0	---	---	---	1.2	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	17	0	---	---	---	0.18	---	---	No	100% Non-Detect
Toluene	108-88-3	17	6	0.00018	0.00125	0.003	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	17	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	17	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	17	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	17	1	0.00078	0.00078	0.00078	16.4	0	<1	No	[Maximum] < ESV
Vinyl Chloride	75-01-4	17	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	17	1	0.00051	0.00051	0.00051	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Total Xylene - 1/2MDL	1330-20-7	17	1	0.00059	0.00059	0.00059	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	17	1	0.00067	0.00067	0.00067	1.4	0	<1	No	[Maximum] < ESV

Table B-6
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Total Xylene - Zero	1330-20-7	17	1	0.00051	0.00051	0.00051	1.4	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH (s.u.)	---	50	50	5.29	6.58	7.87	NESV	---	---	---	---
Total Organic Carbon	7440440	58	57	1070	22216	107000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table B-7
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	38	38	6070	8796	10800	50	38	216	Yes	[Maximum] > ESV
Antimony	7440-36-0	38	0	---	---	---	0.142	---	---	No	100% Non-Detect
Arsenic	7440-38-2	38	38	1.9	4.5	8.2	5.7	1	1.4	Yes	[Maximum] > ESV
Barium	7440-39-3	38	38	67.6	130.7	236	1.04	38	226.9	Yes	[Maximum] > ESV
Beryllium	7440-41-7	38	38	0.3	0.5	0.6	1.06	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	38	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	38	38	6.4	9.5	12.4	23	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	38	38	0.17	0.26	0.33	0.34	0	<1	No	[Maximum] < ESV
Chromium, Trivalent	16065-83-1	38	38	6.23	9.28	12.07	23	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	38	38	4	6	8	0.14	38	54.3	Yes	[Maximum] > ESV
Copper	7440-50-8	38	38	8.9	15.2	22.7	5.4	38	4.2	Yes	[Maximum] > ESV
Iron	7439-89-6	38	38	9160	13882	17600	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	38	38	6.3	9.1	13.6	0.0537	38	253.3	Yes	[Maximum] > ESV
Manganese	7439-96-5	38	38	76.4	300.8	467	220	32	2.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	38	38	0.011	0.021	0.049	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	38	38	9.2	12.6	18.1	10	33	1.8	Yes	[Maximum] > ESV
Selenium	7782-49-2	38	1	0.65	0.65	0.65	0.0276	1	23.6	Yes	[Maximum] > ESV
Silver	7440-22-4	38	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	38	0	---	---	---	0.05	---	---	No	100% Non-Detect
Vanadium	7440-62-2	38	38	7.6	13.5	17.3	1.59	38	10.9	Yes	[Maximum] > ESV
Zinc	7440-66-6	38	38	27.7	42.1	56.3	6.62	38	8.5	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	38	25	0.03	0.77	3.7	0.098	19	37.8	Yes	[Maximum] > ESV
Cyanide (Free)	STL00131	5	0	---	---	---	1.33	---	---	No	100% Non-Detect
Fluoride	16984-48-8	38	38	1.58	15.34	32.7	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	38	38	7410	18067	35100	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	38	38	7060	10582	14800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	38	38	436	885	1290	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	38	22	42.1	108.5	249	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	1	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	1	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	1	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	1	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	1	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	1	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	1	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	1	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	1	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	1	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	1	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	1	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-7
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Gamma Bhc (Lindane)	58-89-9	1	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	1	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	1	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	1	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	1	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	1	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	1	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	1	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	1	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	8	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	8	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	8	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	8	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	8	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	8	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	38	6	0.024	0.157	0.48	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	38	3	0.01	0.02	0.02	0.25	0	<1	No	[Maximum] < ESV
Acenaphthylene	208-96-8	38	3	0.024	0.058	0.1	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	38	0	---	---	---	6.8	---	---	No	100% Non-Detect
Fluoranthene	206-44-0	38	28	0.019	0.098	0.42	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	38	2	0.015	0.027	0.04	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	38	6	0.04	0.28	0.81	0.0994	3	8.1	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	38	22	0.019	0.056	0.21	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	38	30	0.06815	0.27213	1.932	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	38	30	0.1163	0.3141	1.953	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	38	30	0.019	0.23	1.911	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	38	19	0.024	0.092	0.36	1.52	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	38	16	0.038	0.08	0.26	0.73	0	<1	No	[Maximum] < ESV
Benzo(B)Fluoranthene	205-99-2	38	25	0.036	0.158	0.62	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	38	17	0.049	0.123	0.46	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	38	17	0.02	0.06	0.21	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	38	27	0.012	0.106	0.42	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	38	8	0.019	0.051	0.079	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	38	21	0.031	0.124	0.43	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	38	24	0.03	0.13	0.56	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	38	27	0.1045	0.737	3.399	1.1	5	3.1	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	38	27	0.166	0.766	3.399	1.1	5	3.1	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	38	27	0.027	0.708	3.399	1.1	5	3.1	Yes	[Maximum] > ESV

Table B-7
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	38	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	38	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	38	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	38	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	38	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	38	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	38	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	38	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	38	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	38	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	38	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	38	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	38	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	38	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	38	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	38	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	38	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	38	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	38	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	38	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	38	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	38	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	38	1	0.011	0.011	0.011	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	38	4	0.031	0.052	0.088	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	38	0	---	---	---	0.239	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	38	1	0.05	0.05	0.05	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	38	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	38	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	38	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	38	0	---	---	---	0.02	---	---	No	100% Non-Detect
Caprolactam	105-60-2	38	2	0.042	0.044	0.046	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	38	9	0.0089	0.0189	0.051	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	38	1	0.02	0.02	0.02	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	38	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	38	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	38	4	0.014	0.022	0.034	0.011	4	3.1	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	38	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	38	0	---	---	---	0.079	---	---	No	100% Non-Detect

Table B-7
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Hexachlorobutadiene	87-68-3	38	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	38	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	38	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	38	0	---	---	---	139	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	38	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	38	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	38	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	38	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	38	0	---	---	---	0.79	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	19	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	19	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	19	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	19	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	19	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	19	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	19	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	19	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	19	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	19	0	---	---	---	1.23	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	19	0	---	---	---	0.92	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	19	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	19	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	19	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	19	0	---	---	---	0.546	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	19	0	---	---	---	0.36	---	---	No	100% Non-Detect
Acetone	67-64-1	19	19	0.017	0.06	0.18	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	19	19	0.00031	0.00141	0.0022	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	19	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	19	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	19	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	19	0	---	---	---	0.235	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	19	17	0.00032	0.00137	0.0038	0.0941	0	<1	No	[Maximum] < ESV
Carbon Tetrachloride	56-23-5	19	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	19	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	19	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	19	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	19	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	19	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	19	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	19	18	0.00047	0.00235	0.005	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	19	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	19	0	---	---	---	39.5	---	---	No	100% Non-Detect

Table B-7
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Ethylbenzene	100-41-4	19	15	0.00037	0.00063	0.0012	5.16	0	<1	No	[Maximum] < ESV
Isopropylbenzene (Cumene)	98-82-8	19	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	19	3	0.011	0.324	0.6	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	19	18	0.0037	0.0058	0.013	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	19	0	---	---	---	9.7	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	19	19	0.00058	0.00422	0.011	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	19	3	0.00031	0.00115	0.0027	2.6	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	19	0	---	---	---	1.2	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	19	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	19	1	0.0004	0.0004	0.0004	0.18	0	<1	No	[Maximum] < ESV
Toluene	108-88-3	19	19	0.0011	0.0031	0.0069	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	19	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	19	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	19	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	19	0	---	---	---	16.4	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	19	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	19	19	0.00031	0.00144	0.0033	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	19	18	0.00011	0.00048	0.0011	NESV	---	---	Yes	No ESV Available
Total Xylene - 1/2MDL	1330-20-7	19	19	0.000405	0.001902	0.0044	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	19	19	0.00042	0.00191	0.0044	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	1330-20-7	19	19	0.00034	0.0019	0.0044	1.4	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH (s.u.)	---	30	30	7.4	8.2	9	NESV	---	---	---	---
Total Organic Carbon	7440440	30	30	6040	13820	30800	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-8a
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Upper RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	86	86	9014	21350	39465	50	86	789.3	Yes	[Maximum] > ESV
Antimony	7440-36-0	86	75	0.141	0.796	11.0	0.142	74	77.6	Yes	[Maximum] > ESV
Arsenic	7440-38-2	86	86	4.41	7.02	35.6	5.7	50	6.3	Yes	[Maximum] > ESV
Barium	7440-39-3	86	86	61.8	159	330	1.04	86	317.2	Yes	[Maximum] > ESV
Beryllium	7440-41-7	86	86	0.420	0.882	3.93	1.06	16	3.7	Yes	[Maximum] > ESV
Cadmium	7440-43-9	86	86	0.057	0.325	1.84	0.00222	86	829	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	86	86	14.3	23.1	58.6	23	25	2.5	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	86	86	0.382	0.619	1.57	0.34	86	4.6	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	86	86	13.9	22.5	57.0	23	24	2.5	Yes	[Maximum] > ESV
Cobalt	7440-48-4	86	86	5.59	6.64	14.0	0.14	86	99.8	Yes	[Maximum] > ESV
Copper	7440-50-8	86	86	14.8	69.5	996	5.4	86	184.4	Yes	[Maximum] > ESV
Iron	7439-89-6	86	86	14373	19400	68967	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	86	86	8.89	46.5	603	0.0537	86	11228.5	Yes	[Maximum] > ESV
Manganese	7439-96-5	86	86	360	522	902	220	86	4.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	86	60	0.020	0.037	0.140	0.1	1	1.4	Yes	[Maximum] > ESV
Nickel	7440-02-0	86	86	14.4	33.4	163	10	86	16.3	Yes	[Maximum] > ESV
Selenium	7782-49-2	86	86	0.214	1.74	16.0	0.0276	86	578.1	Yes	[Maximum] > ESV
Silver	7440-22-4	86	86	0.032	0.128	1.42	2	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	86	86	0.064	0.133	0.457	0.05	86	9.1	Yes	[Maximum] > ESV
Vanadium	7440-62-2	86	86	8.88	20.1	59.5	1.59	86	37.4	Yes	[Maximum] > ESV
Zinc	7440-66-6	86	86	46.8	125	1939	6.62	86	292.8	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	86	84	0.023	1.18	25.5	0.098	78	260.4	Yes	[Maximum] > ESV
Fluoride	16984-48-8	86	86	21.4	333	1218	120	49	10.2	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	86	86	2886	21316	50575	NESV	---	---	Yes	No ESV Available
Magnesium	7439-95-4	86	86	6979	10849	13590	NESV	---	---	Yes	No ESV Available
Potassium	7440-09-7	86	86	771	1549	3272	NESV	---	---	Yes	No ESV Available
Sodium	7440-23-5	86	82	55.8	1332	11767	NESV	---	---	Yes	No ESV Available
Pesticides (mg/kg)											
Aldrin	309-00-2	43	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	43	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	43	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	43	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	43	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	43	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	43	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	43	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	43	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	43	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	43	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	43	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	43	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	43	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	43	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	43	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	43	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	43	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	86	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	86	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	86	1	0.200	0.200	0.200	0.0073	1	27.4	Yes	[Maximum] > ESV
PCB-1254 (Aroclor 1254)	11097-69-1	86	14	0.110	0.426	1.73	0.041	14	42.2	Yes	[Maximum] > ESV
PCB-1260 (Aroclor 1260)	11096-82-5	86	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	86	15	0.110	0.430	1.73	0.000332	15	5207.2	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	86	72	0.003	1.04	39.9	3.24	4	12.3	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	86	84	0.014	4.66	199	0.25	43	796.1	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	86	26	0.002	0.427	5.05	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	86	80	0.027	7.98	274	6.8	10	40.2	Yes	[Maximum] > ESV

Table B-8a
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Upper RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Fluoranthene	206-44-0	86	86	0.036	29.0	754	10	23	75.4	Yes	[Maximum] > ESV
Fluorene	86-73-7	86	83	0.011	3.85	164	3.7	6	44.2	Yes	[Maximum] > ESV
Naphthalene	91-20-3	86	76	0.005	2.05	87.6	0.0994	34	881.5	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	86	86	0.020	25.6	801	5.5	22	145.7	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	86	86	0.118	73.3	2339	29	20	80.6	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	86	86	0.181	73.3	2339	29	20	80.6	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	86	86	0.056	73.3	2339	29	20	80.6	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	86	85	0.030	16.7	401	1.52	53	264.1	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	86	84	0.139	16.4	405	0.73	61	554.9	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	86	86	0.035	20.0	432	18	16	24	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	86	85	0.040	14.2	354	25	9	14.1	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	86	85	0.025	7.92	214	71	1	3	Yes	[Maximum] > ESV
Chrysene	218-01-9	86	86	0.036	18.6	407	3.1	46	131.4	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	86	82	0.034	3.98	83.6	14	4	6	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	86	84	0.110	12.9	275	71	4	3.9	Yes	[Maximum] > ESV
Pyrene	129-00-0	86	86	0.029	27.9	708	10	21	70.8	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	86	86	0.222	133	3263	1.1	84	2966.4	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	86	86	0.313	133	3263	1.1	84	2966.4	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	86	86	0.130	133	3263	1.1	84	2966.4	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	86	86	0.269	185	5094		86	---	Yes	No ESV Available
Total PAHs - MDL	---	86	86	0.417	185	5094		86	---	Yes	No ESV Available
Total PAHs - Zero	---	86	86	0.121	185	5094		86	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	86	0	---	--	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	86	0	---	--	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	86	0	---	--	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	86	0	---	--	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	86	0	---	--	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	86	0	---	--	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol'	105-67-9	86	2	0.250	0.480	0.710	0.01	2	71	Yes	[Maximum] > ESV
2,4-Dinitrophenol	51-28-5	86	0	---	--	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	86	0	---	--	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	86	0	---	--	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	86	0	---	--	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	86	0	---	--	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	86	0	---	--	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	86	0	---	--	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	86	0	---	--	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)'	106445	62	2	0.011	0.014	0.017	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	86	0	---	--	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	86	0	---	--	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	86	0	---	--	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	86	0	---	--	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	86	0	---	--	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	86	0	---	--	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	86	0	---	--	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	86	0	---	--	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	86	0	---	--	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	86	21	0.003	0.021	0.043	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	86	0	---	--	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde'	100-52-7	86	8	0.007	0.026	0.051	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	86	16	0.013	0.233	1.40	0.239	4	5.9	Yes	[Maximum] > ESV

Table B-8a
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Upper RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Biphenyl (Diphenyl)	92-52-4	86	20	0.003	1.18	14.1	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	86	0	---	--	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	86	0	---	--	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	86	0	---	--	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate ¹	117-81-7	86	16	0.014	0.115	0.810	0.02	15	40.5	Yes	[Maximum] > ESV
Caprolactam	105-60-2	86	0	---	--	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	86	84	0.021	4.09	137	79	1	1.7	Yes	[Maximum] > ESV
Dibenzofuran	132-64-9	86	78	0.006	2.30	93.5	6.1	4	15.3	Yes	[Maximum] > ESV
Diethyl Phthalate ¹	84-66-2	86	2	0.014	0.015	0.015	24.8	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	86	0	---	--	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate ¹	84-74-2	86	22	0.011	0.025	0.067	0.011	20	6.1	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	86	0	---	--	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	86	0	---	--	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	86	0	---	--	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	86	0	---	--	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	86	0	---	--	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	86	13	0.006	0.055	0.146	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	86	0	---	--	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	86	0	---	--	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	86	0	---	--	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol ¹	87-86-5	86	1	0.100	0.100	0.100	0.119	0	<1	No	[Maximum] < ESV
Phenol ¹	108-95-2	86	9	0.012	0.018	0.033	0.79	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH	PH	24	24	6.20	7.19	8.36	NESV	---	---	---	---
Total Organic Carbon	7440440	24	23	6282	21089	64145	NESV	---	---	---	---

Notes:
¹ No RSD adjustment or UCL substitution due to no detected results in replicate samples. Measured results used instead
---, Not applicable.
COPEC: Constituent of Potential Ecological Concern
ESV, Ecological Screening Value
HMW, High molecular weight
HQ, Hazard Quotient
HQ_{Max}, Maximum hazard quotient,
LMW, Low molecular weight
[Maximum]: Maximum concentration
mg/kg, milligrams per kilograms
MDL: Method Detection Limit
NESV: No Ecological Screening Value
PAH, Polycyclic Aromatic Hydrocarbon
PCB, Polychlorinated Biphenyl
SVOC, Semi-Volatile Organic Compound
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table B-8b
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Measured Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	86	86	8620	20499	37700	50	86	754	Yes	[Maximum] > ESV
Antimony	7440-36-0	86	75	0.092	0.588	8.60	0.142	61	60.6	Yes	[Maximum] > ESV
Arsenic	7440-38-2	86	86	4.10	6.39	31.3	5.7	36	5.5	Yes	[Maximum] > ESV
Barium	7440-39-3	86	86	59.4	150	302	1.04	86	290.4	Yes	[Maximum] > ESV
Beryllium	7440-41-7	86	86	0.400	0.839	3.70	1.06	14	3.5	Yes	[Maximum] > ESV
Cadmium	7440-43-9	86	86	0.054	0.291	1.60	0.00222	86	720.7	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	86	86	12.9	21.3	54.4	23	21	2.4	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	86	86	0.345	0.571	1.46	0.34	86	4.3	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	86	86	12.6	20.7	52.9	23	20	2.3	Yes	[Maximum] > ESV
Cobalt	7440-48-4	86	86	5.40	6.48	13.5	0.14	86	96.4	Yes	[Maximum] > ESV
Copper	7440-50-8	86	86	14.1	63.7	887	5.4	86	164.3	Yes	[Maximum] > ESV
Iron	7439-89-6	86	86	13900	18893	66700	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	86	86	8.60	35.2	406	0.0537	86	7560.5	Yes	[Maximum] > ESV
Manganese	7439-96-5	86	86	341	494	902	220	86	4.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	86	60	0.013	0.028	0.140	0.1	1	1.4	Yes	[Maximum] > ESV
Nickel	7440-02-0	86	86	13.4	30.1	142	10	86	14.2	Yes	[Maximum] > ESV
Selenium	7782-49-2	86	86	0.180	1.48	13.3	0.0276	86	481.9	Yes	[Maximum] > ESV
Silver	7440-22-4	86	86	0.029	0.118	1.30	2	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	86	86	0.060	0.122	0.400	0.05	86	8	Yes	[Maximum] > ESV
Vanadium	7440-62-2	86	86	8.60	19.0	54.5	1.59	86	34.3	Yes	[Maximum] > ESV
Zinc	7440-66-6	86	86	44.4	114	1720	6.62	86	259.8	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	86	84	0.017	0.928	18.2	0.098	76	185.7	Yes	[Maximum] > ESV
Fluoride	16984-48-8	86	86	16.6	272	976	120	47	8.1	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	86	86	2886	19082	45700	NESV	---	---	Yes	No ESV Available
Magnesium	7439-95-4	86	86	6830	10612	13300	NESV	---	---	Yes	No ESV Available
Potassium	7440-09-7	86	86	721	1464	3080	NESV	---	---	Yes	No ESV Available
Sodium	7440-23-5	86	82	46.1	1084	9000	NESV	---	---	Yes	No ESV Available
Pesticides (mg/kg)											
Aldrin	309-00-2	43	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	43	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	43	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	43	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	43	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	43	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	43	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	43	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	43	0	---	---	---	0.0105	---	---	No	100% Non-Detect

Table B-8b
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Measured Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Endrin Ketone	53494-70-5	43	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	43	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	43	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	43	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	43	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	43	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	43	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	43	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	43	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	86	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	86	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248) ¹	12672-29-6	86	1	0.200	0.200	0.200	0.0073	1	27.4	Yes	[Maximum] > ESV
PCB-1254 (Aroclor 1254)	11097-69-1	86	14	0.046	0.310	1.73	0.041	14	42.2	Yes	[Maximum] > ESV
PCB-1260 (Aroclor 1260)	11096-82-5	86	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	86	15	0.046	0.303	1.73	0.000332	15	5207.2	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	86	72	0.003	0.706	27.0	3.24	4	8.3	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	86	84	0.008	2.78	110	0.25	38	440	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	86	26	0.001	0.288	3.10	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	86	80	0.027	4.86	150	6.8	8	22.1	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	86	86	0.021	19.1	440	10	17	44	Yes	[Maximum] > ESV
Fluorene	86-73-7	86	83	0.010	2.37	94.0	3.7	6	25.4	Yes	[Maximum] > ESV
Naphthalene	91-20-3	86	76	0.005	1.55	68.0	0.0994	27	684.1	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	86	86	0.011	16.3	450	5.5	20	81.8	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	86	86	0.068	46.9	1342	29	16	46.3	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	86	86	0.104	46.9	1342	29	16	46.3	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	86	86	0.032	46.8	1342	29	16	46.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	86	85	0.018	11.2	240	1.52	46	157.9	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	86	84	0.084	11.1	240	0.73	56	328.8	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	86	86	0.022	14.2	270	18	13	15	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	86	85	0.025	9.94	220	25	6	8.8	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	86	85	0.015	5.45	130	71	1	1.8	Yes	[Maximum] > ESV
Chrysene	218-01-9	86	86	0.022	12.9	250	3.1	38	80.6	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	86	82	0.021	2.70	51.0	14	4	3.6	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	86	84	0.076	9.07	170	71	3	2.4	Yes	[Maximum] > ESV
Pyrene	129-00-0	86	86	0.017	18.2	410	10	18	41	Yes	[Maximum] > ESV

Table B-8b
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Measured Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Total HMW PAHs - 1/2MDL	---	86	86	0.135	93.5	1981	1.1	80	1800.9	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	86	86	0.190	93.5	1981	1.1	80	1800.9	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	86	86	0.079	93.5	1981	1.1	80	1800.9	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	86	86	0.160	126	3026		86	---	Yes	No ESV Available
Total PAHs - MDL	---	86	86	0.248	126	3026		86	---	Yes	No ESV Available
Total PAHs - Zero	---	86	86	0.072	126	3026		86	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	86	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	86	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	86	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	86	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	86	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	86	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol ¹	105-67-9	86	2	0.250	0.480	0.710	0.01	2	71	Yes	[Maximum] > ESV
2,4-Dinitrophenol	51-28-5	86	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	86	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	86	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	86	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	86	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	86	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	86	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	86	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total) ¹	106445	62	2	0.011	0.014	0.017	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	86	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	86	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	86	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	86	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	86	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	86	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	86	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	86	21	0.002	0.015	0.030	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde ¹	100-52-7	86	8	0.007	0.026	0.051	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	86	16	0.010	0.230	1.40	0.239	4	5.9	Yes	[Maximum] > ESV
Biphenyl (Diphenyl)	92-52-4	86	20	0.001	0.632	7.10	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	86	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	86	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	86	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate ¹	117-81-7	86	16	0.014	0.115	0.810	0.02	15	40.5	Yes	[Maximum] > ESV

Table B-8b
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Measured Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Caprolactam	105-60-2	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	86	84	0.012	2.61	78.0	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	86	78	0.006	1.44	55.0	6.1	4	9	Yes	[Maximum] > ESV
Diethyl Phthalate ¹	84-66-2	86	2	0.014	0.015	0.015	24.8	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	86	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate ¹	84-74-2	86	22	0.011	0.025	0.067	0.011	20	6.1	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	86	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	86	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	86	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	86	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	86	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	86	13	0.006	0.048	0.110	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	86	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	86	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	86	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol ¹	87-86-5	86	1	0.100	0.100	0.100	0.119	0	<1	No	[Maximum] < ESV
Phenol ¹	108-95-2	86	9	0.012	0.018	0.033	0.79	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH	PH	24	24	6.20	7.19	8.36	NESV	---	---	---	---
Total Organic Carbon	7440440	24	23	3800	17340	38800	NESV	---	---	---	---

Notes:

¹ No UCL substitution due to no detected results in replicate samples. Measured results used instead.

---, Not applicable.

COPEC: Constituent of Potential Ecological Concern

ESV, Ecological Screening Value

HMW, High molecular weight

HQ, Hazard Quotient

HQ_{Max}, Maximum hazard quotient,

LMW, Low molecular weight

[Maximum]: Maximum concentration

mg/kg, milligrams per kilograms

MDL: Method Detection Limit

NESV: No Ecological Screening Value

PAH, Polycyclic Aromatic Hydrocarbon

PCB, Polychlorinated Biphenyl

SVOC, Semi-Volatile Organic Compound

TAL: Target Analyte List

TCL: Target Compound List

TEC: Toxic Equivalency Concentration

Table B-8c
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Lower RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	86	86	8226	19649	35935	50	86	718.7	Yes	[Maximum] > ESV
Antimony	7440-36-0	86	75	0.027	0.379	6.19	0.142	37	43.6	Yes	[Maximum] > ESV
Arsenic	7440-38-2	86	86	3.62	5.76	27.0	5.7	22	4.7	Yes	[Maximum] > ESV
Barium	7440-39-3	86	86	57.0	141	281	1.04	86	270.4	Yes	[Maximum] > ESV
Beryllium	7440-41-7	86	86	0.380	0.796	3.47	1.06	11	3.3	Yes	[Maximum] > ESV
Cadmium	7440-43-9	86	86	0.051	0.257	1.36	0.00222	86	612.4	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	86	86	11.5	19.5	50.2	23	18	2.2	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	86	86	0.309	0.522	1.34	0.34	84	4	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	86	86	11.2	19.0	48.8	23	17	2.1	Yes	[Maximum] > ESV
Cobalt	7440-48-4	86	86	5.21	6.31	13.0	0.14	86	93	Yes	[Maximum] > ESV
Copper	7440-50-8	86	86	13.4	57.9	778	5.4	86	144.1	Yes	[Maximum] > ESV
Iron	7439-89-6	86	86	13427	18386	64433	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	86	86	6.18	24.0	253	0.0537	86	4708.4	Yes	[Maximum] > ESV
Manganese	7439-96-5	86	86	322	465	902	220	86	4.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	86	60	0.006	0.018	0.140	0.1	1	1.4	Yes	[Maximum] > ESV
Nickel	7440-02-0	86	86	11.5	26.9	121	10	86	12.1	Yes	[Maximum] > ESV
Selenium	7782-49-2	86	86	0.146	1.21	10.6	0.0276	86	385.7	Yes	[Maximum] > ESV
Silver	7440-22-4	86	86	0.026	0.107	1.18	2	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	86	86	0.056	0.110	0.387	0.05	86	7.7	Yes	[Maximum] > ESV
Vanadium	7440-62-2	86	86	8.32	17.8	52.3	1.59	86	32.9	Yes	[Maximum] > ESV
Zinc	7440-66-6	86	86	42.0	103	1501	6.62	86	226.8	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	86	84	0.011	0.671	10.9	0.098	62	111.1	Yes	[Maximum] > ESV
Fluoride	16984-48-8	86	86	11.8	212	781	120	43	6.5	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	86	86	2886	16847	40825	NESV	---	---	Yes	No ESV Available
Magnesium	7439-95-4	86	86	6681	10374	13010	NESV	---	---	Yes	No ESV Available
Potassium	7440-09-7	86	86	671	1379	3069	NESV	---	---	Yes	No ESV Available
Sodium	7440-23-5	86	82	36.4	836	6298	NESV	---	---	Yes	No ESV Available
Pesticides (mg/kg)											
Aldrin	309-00-2	43	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	43	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	43	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	43	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	43	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	43	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	43	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	43	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	43	0	---	---	---	0.0105	---	---	No	100% Non-Detect

Table B-8c
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Lower RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Endrin Ketone	53494-70-5	43	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	43	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	43	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	43	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	43	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	43	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	43	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	43	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	43	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	43	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	86	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	86	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248) ¹	12672-29-6	86	1	0.200	0.200	0.200	0.0073	1	27.4	Yes	[Maximum] > ESV
PCB-1254 (Aroclor 1254)	11097-69-1	86	14	-0.106856201	0.194	1.73	0.041	7	42.2	Yes	[Maximum] > ESV
PCB-1260 (Aroclor 1260)	11096-82-5	86	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	86	15	-0.106856201	0.176	1.73	0.000332	7	5207.2	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	86	72	0.002	0.373	14.1	3.24	2	4.4	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	86	84	0.002	0.897	22.0	0.25	20	88.2	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	86	26	0.000520709	0.148	1.92	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	86	80	0.005	1.74	44.3	6.8	5	6.5	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	86	86	0.006	9.09	188	10	15	18.8	Yes	[Maximum] > ESV
Fluorene	86-73-7	86	83	0.002	0.897	24.3	3.7	4	6.6	Yes	[Maximum] > ESV
Naphthalene	91-20-3	86	76	0.005	1.05	48.4	0.0994	24	486.7	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	86	86	0.002	6.94	186	5.5	15	33.9	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	86	86	0.017	20.4	474	29	11	16.4	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	86	86	0.027	20.4	475	29	11	16.4	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	86	86	0.008	20.4	474	29	11	16.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	86	85	0.006	5.67	83.0	1.52	33	54.6	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	86	84	0.026	5.79	95.1	0.73	47	130.3	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	86	86	0.009	8.49	108	18	10	6	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	86	85	0.010	5.67	86.3	25	4	3.5	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	86	85	0.005	2.98	46.1	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	86	86	0.008	7.17	103	3.1	28	33.1	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	86	82	0.008	1.41	18.4	14	3	1.3	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	86	84	0.029	5.20	68.9	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	86	86	0.005	8.47	176	10	15	17.6	Yes	[Maximum] > ESV

Table B-8c
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Lower RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Total HMW PAHs - 1/2MDL	---	86	86	0.047	53.7	828	1.1	72	752.7	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	86	86	0.067	53.7	828	1.1	72	752.7	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	86	86	0.028	53.7	828	1.1	72	752.7	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	86	86	0.051	65.9	1205		86	---	Yes	No ESV Available
Total PAHs - MDL	---	86	86	0.078	65.9	1205		86	---	Yes	No ESV Available
Total PAHs - Zero	---	86	86	0.023	65.8	1205		86	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	86	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	86	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	86	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	86	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	86	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	86	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol ¹	105-67-9	86	2	0.250	0.480	0.710	0.01	2	71	Yes	[Maximum] > ESV
2,4-Dinitrophenol	51-28-5	86	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	86	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	86	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	86	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	86	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	86	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	86	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	86	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total) ¹	106445	62	2	0.011	0.014	0.017	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	86	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	86	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	86	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	86	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	86	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	86	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	86	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	86	21	0.001	0.009	0.017	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde ¹	100-52-7	86	8	0.007	0.026	0.051	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	86	16	0.007	0.227	1.40	0.239	4	5.9	Yes	[Maximum] > ESV
Biphenyl (Diphenyl)	92-52-4	86	20	2.33972E-05	0.089	1.06	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	86	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	86	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	86	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate ¹	117-81-7	86	16	0.014	0.115	0.810	0.02	15	40.5	Yes	[Maximum] > ESV

Table B-8c
Screening-Level Ecological Exposure Estimate for Bulk Soil Using Lower RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Caprolactam	105-60-2	86	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	86	84	0.003	1.13	26.4	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	86	78	0.002	0.584	16.5	6.1	2	2.7	Yes	[Maximum] > ESV
Diethyl Phthalate ¹	84-66-2	86	2	0.014	0.015	0.015	24.8	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	86	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate ¹	84-74-2	86	22	0.011	0.025	0.067	0.011	20	6.1	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	86	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	86	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	86	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	86	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	86	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	86	13	0.006	0.041	0.099	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	86	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	86	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	86	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol ¹	87-86-5	86	1	0.100	0.100	0.100	0.119	0	<1	No	[Maximum] < ESV
Phenol ¹	108-95-2	86	9	0.012	0.018	0.033	0.79	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH	PH	24	24	6.20	7.19	8.36	NESV	---	---	---	---
Total Organic Carbon	7440440	24	23	1318	13592	30142	NESV	---	---	---	---

Notes:
¹ No RSD adjustment or UCL substitution due to no detected results in replicate samples. Measured results used instead.
---, Not applicable.
COPEC: Constituent of Potential Ecological Concern
ESV, Ecological Screening Value
HMW, High molecular weight
HQ, Hazard Quotient
HQ_{Max}, Maximum hazard quotient,
LMW, Low molecular weight
[Maximum]: Maximum concentration
mg/kg, milligrams per kilograms
MDL: Method Detection Limit
NESV: No Ecological Screening Value
PAH, Polycyclic Aromatic Hydrocarbon
PCB, Polychlorinated Biphenyl
SVOC, Semi-Volatile Organic Compound
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table B-9
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	42	42	6290	35213	123000	50	42	2460	Yes	[Maximum] > ESV
Antimony	7440-36-0	42	10	0.43	1.45	2.6	0.142	10	18.3	Yes	[Maximum] > ESV
Arsenic	7440-38-2	42	42	2.4	11	34.1	5.7	32	6	Yes	[Maximum] > ESV
Barium	7440-39-3	42	42	19.6	211.6	1560	1.04	42	1500	Yes	[Maximum] > ESV
Beryllium	7440-41-7	42	42	0.31	2.71	17.2	1.06	25	16.2	Yes	[Maximum] > ESV
Cadmium	7440-43-9	42	36	0.29	2.48	9.6	0.00222	36	4324.3	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	46	46	5.6	21.7	53	23	16	2.3	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	44	39	0.2	0.6	1.4	0.34	29	4.1	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	44	44	5.52	20.01	50.12	23	14	2.2	Yes	[Maximum] > ESV
Cobalt	7440-48-4	42	42	1.2	6.6	27.4	0.14	42	195.7	Yes	[Maximum] > ESV
Copper	7440-50-8	42	42	6.4	28.3	83.6	5.4	42	15.5	Yes	[Maximum] > ESV
Iron	7439-89-6	42	42	1330	9661	23600	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	42	42	6.4	48	238	0.0537	42	4432	Yes	[Maximum] > ESV
Manganese	7439-96-5	42	42	12.8	172.2	762	220	12	3.5	Yes	[Maximum] > ESV
Mercury	7439-97-6	42	32	0.012	0.035	0.12	0.1	1	1.2	Yes	[Maximum] > ESV
Nickel	7440-02-0	42	42	10.3	188.2	1250	10	42	125	Yes	[Maximum] > ESV
Selenium	7782-49-2	42	26	0.34	1.19	3.4	0.0276	26	123.2	Yes	[Maximum] > ESV
Silver	7440-22-4	42	3	0.7	0.9	1	2	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	42	35	0.14	0.95	4.6	0.05	35	92	Yes	[Maximum] > ESV
Vanadium	7440-62-2	42	42	6.1	62.6	348	1.59	42	218.9	Yes	[Maximum] > ESV
Zinc	7440-66-6	42	42	29.2	216.1	871	6.62	42	131.6	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	42	41	0.078	13.598	137	0.098	38	1398	Yes	[Maximum] > ESV
Fluoride	16984-48-8	42	42	2.42	86.44	306	120	12	2.6	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	42	42	427	21195	106000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	42	42	442	6561	21800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	42	42	101	868	3200	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	42	38	28.3	406	2390	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	9	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	9	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	9	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	9	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	9	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	9	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	9	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	9	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	9	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	9	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	9	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	9	0	---	---	---	0.005	---	---	No	100% Non-Detect

Table B-9
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor	76-44-8	9	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	9	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	9	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	9	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	9	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	9	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	9	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	9	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	20	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	20	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	20	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	20	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	20	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	20	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	40	30	0.0055	0.963	6.9	3.24	3	2.1	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	41	40	0.016	13.475	190	0.25	28	760	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	41	7	0.033	0.563	1.2	120	0	<1	No	[Maximum] < ESV
Anthracene	120-12-7	41	40	0.049	25.116	250	6.8	16	36.8	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	41	40	0.029	309.111	3700	10	27	370	Yes	[Maximum] > ESV
Fluorene	86-73-7	41	33	0.012	8.238	82	3.7	11	22.2	Yes	[Maximum] > ESV
Naphthalene	91-20-3	41	28	0.028	1.628	12	0.0994	23	120.7	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	41	40	0.23	101.33	1300	5.5	25	236.4	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	41	40	1.26675	459.17222	5561.4	29	23	191.8	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	41	40	1.2855	460.555	5593.9	29	23	192.9	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	41	40	1.248	457.789	5528.9	29	23	190.7	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	41	39	0.95	202.76	3100	1.52	37	2039.5	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	41	39	0.66	184.73	2700	0.73	38	3698.6	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	41	39	1.6	238.8	3000	18	25	166.7	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	41	39	1.2	152	2200	25	18	88	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	41	39	1.2	144.9	2400	71	8	33.8	Yes	[Maximum] > ESV
Chrysene	218-01-9	41	40	0.011	208.761	2800	3.1	35	903.2	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	41	39	0.35	50.01	740	14	13	52.9	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	41	39	1.1	141.7	2000	71	9	28.2	Yes	[Maximum] > ESV
Pyrene	129-00-0	41	40	0.058	272.596	3200	10	26	320	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	41	41	0.0865	1530.144	22140	1.1	39	20127.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	41	41	0.162	1530.148	22140	1.1	39	20127.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	41	41	0.011	1530.14	22140	1.1	39	20127.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											

Table B-9
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2,4,5-Tetrachlorobenzene	95-94-3	40	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	40	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	40	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	40	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	40	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	40	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	40	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	40	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	40	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	40	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	40	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	40	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	40	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	40	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	40	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	20	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	40	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	40	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	40	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	40	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	40	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	40	1	0.13	0.13	0.13	1	0	<1	No	[Maximum] < ESV
4-Chlorophenyl Phenyl Ether	7005-72-3	40	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	40	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	40	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	40	1	0.011	0.011	0.011	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	40	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	40	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzyl Butyl Phthalate	85-68-7	40	1	0.55	0.55	0.55	0.239	1	2.3	Yes	[Maximum] > ESV
Biphenyl (Diphenyl)	92-52-4	40	6	0.0021	0.161	0.55	60	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	40	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	40	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	40	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	40	4	0.17	1.62	5.9	0.02	4	295	Yes	[Maximum] > ESV
Caprolactam	105-60-2	40	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	40	38	0.0043	12.855	190	79	1	2.4	Yes	[Maximum] > ESV
Dibenzofuran	132-64-9	40	37	0.019	2.566	28	6.1	5	4.6	Yes	[Maximum] > ESV
Diethyl Phthalate	84-66-2	40	2	0.022	1.161	2.3	24.8	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	40	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	40	0	---	---	---	0.011	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	40	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	40	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	40	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	40	0	---	---	---	0.755	---	---	No	100% Non-Detect

Table B-9
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Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Hexachloroethane	67-72-1	40	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	40	0	---	---	---	139	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	40	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	40	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	40	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	40	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	40	1	0.26	0.26	0.26	0.79	0	<1	No	[Maximum] < ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	9	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	9	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	9	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	9	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	9	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	9	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	9	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	9	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	9	0	---	---	---	1.23	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	9	0	---	---	---	0.92	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	9	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	9	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	9	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	9	0	---	---	---	0.546	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	9	2	0.0024	0.003	0.0036	0.36	0	<1	No	[Maximum] < ESV
Acetone	67-64-1	9	9	0.0096	0.1426	0.31	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	9	4	0.00043	0.00146	0.0031	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	9	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	9	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	9	0	---	---	---	0.235	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	9	6	0.00092	0.0039	0.0059	0.0941	0	<1	No	[Maximum] < ESV
Carbon Tetrachloride	56-23-5	9	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	9	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	9	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	9	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	9	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	9	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	9	3	0.0027	0.0048	0.0086	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	9	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	9	0	---	---	---	39.5	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	9	3	0.0015	0.0023	0.0038	5.16	0	<1	No	[Maximum] < ESV
Isopropylbenzene (Cumene)	98-82-8	9	2	0.0002	0.0004	0.0005	NESV	---	---	Yes	No ESV Available

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Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methyl Acetate	79-20-9	9	5	0.0022	0.0044	0.0065	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	9	7	0.002	0.023	0.041	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	9	0	---	---	---	9.7	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	9	3	0.0052	0.0086	0.015	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	9	1	0.002	0.002	0.002	2.6	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	9	0	---	---	---	1.2	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	9	0	---	---	---	0.18	---	---	No	100% Non-Detect
Toluene	108-88-3	9	8	0.00033	0.00338	0.013	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	9	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	9	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	9	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	9	0	---	---	---	16.4	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	9	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	9	5	0.00016	0.00359	0.0091	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	9	3	0.00094	0.00195	0.0032	NESV	---	---	Yes	No ESV Available
Total Xylene - 1/2MDL	1330-20-7	9	5	0.00026	0.00482	0.0123	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	9	5	0.00036	0.00489	0.0123	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	1330-20-7	9	5	0.00016	0.00476	0.0123	1.4	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
pH (s.u.)	---	22	22	5.57	6.98	7.82	NESV	---	---	---	---
Total Organic Carbon	7440440	24	23	12300	108674	494000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-10
Screening-Level Ecological Exposure Estimate for Surface Water
North Percolations Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (ug/L)												
Aluminum	7429-90-5	U	2	2	109	4370	8630	87	2	99.2	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	1	1	4780	4780	4780	87	1	54.9	Yes	[Maximum] > ESV
Antimony	7440-36-0	U	2	1	7.7	7.7	7.7	30	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	F	1	1	7.2	7.2	7.2	30	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	U	2	1	2.4	2.4	2.4	5	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	F	1	1	1	1	1	3.1	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	U	2	2	43.4	138.7	234	4	2	58.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	1	1	26.4	26.4	26.4	4	1	6.6	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	2	1	0.71	0.71	0.71	0.66	1	1.1	Yes	[Maximum] > ESV
Beryllium	7440-41-7	F	1	1	0.51	0.51	0.51	0.66	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	U	2	1	3	3	3	0.089	1	33.6	Yes	[Maximum] > ESV
Cadmium	7440-43-9	F	1	1	2.5	2.5	2.5	0.089	1	28	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	U	2	1	2.7	2.7	2.7	8.9	0	<1	No	[Maximum] < ESV
Chromium, Total	7440-47-3	F	1	0	---	---	---	8.9	---	---	No	100% Non-Detect
Cobalt	7440-48-4	U	2	1	1.6	1.6	1.6	5.1	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	F	1	0	---	---	---	5.1	---	---	No	100% Non-Detect
Copper	7440-50-8	U	2	2	3.8	10.2	16.5	0.23	2	71.7	Yes	[Maximum] > ESV
Copper	7440-50-8	F	1	1	2	2	2	0.23	1	8.7	Yes	[Maximum] > ESV
Iron	7439-89-6	U	2	1	817	817	817	300	1	2.7	Yes	[Maximum] > ESV
Iron	7439-89-6	F	1	0	---	---	---	158	---	---	No	100% Non-Detect
Lead	7439-92-1	U	2	1	7.6	7.6	7.6	1.316	1	5.8	Yes	[Maximum] > ESV
Lead	7439-92-1	F	1	0	---	---	---	1.172	---	---	No	100% Non-Detect
Manganese	7439-96-5	U	2	1	37.4	37.4	37.4	120	0	<1	No	[Maximum] < ESV
Manganese	7439-96-5	F	1	1	31.8	31.8	31.8	120	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	U	2	0	---	---	---	0.026	---	---	No	100% Non-Detect
Mercury	7439-97-6	F	1	0	---	---	---	0.026	---	---	No	100% Non-Detect
Nickel	7440-02-0	U	2	2	1.9	28.9	55.9	29.0196	1	1.9	Yes	[Maximum] > ESV
Nickel	7440-02-0	F	1	1	22.1	22.1	22.1	5	1	4.4	Yes	[Maximum] > ESV
Selenium	7782-49-2	U	2	0	---	---	---	1	---	---	No	100% Non-Detect
Selenium	7782-49-2	F	1	0	---	---	---	3.1	---	---	No	100% Non-Detect
Silver	7440-22-4	U	2	0	---	---	---	0.25	---	---	No	100% Non-Detect
Silver	7440-22-4	F	1	0	---	---	---	0.12	---	---	No	100% Non-Detect
Thallium	7440-28-0	U	2	1	0.27	0.27	0.27	0.8	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	F	1	0	---	---	---	12	---	---	No	100% Non-Detect
Vanadium	7440-62-2	U	2	2	6.9	12.4	18	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	F	1	1	4.3	4.3	4.3	20	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	U	2	1	537	537	537	66.597	1	8.1	Yes	[Maximum] > ESV
Zinc	7440-66-6	F	1	1	512	512	512	7	1	73.1	Yes	[Maximum] > ESV
Other Inorganic Parameters (ug/L unless otherwise noted)												
Chloride (As Cl)	16887-00-6	U	2	2	1390	1495	1600	120000	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	U	2	1	7.6	7.6	7.6	5.2	1	1.5	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	1	0	---	---	---	5.2	---	---	No	100% Non-Detect
Fluoride	16984-48-8	U	2	2	2150	12275	22400	120	2	186.7	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	1	1	21500	21500	21500	120	1	179.2	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	2	1	1840	1840	1840	3327.436	0	<1	No	[Maximum] < ESV
Essential Nutrients (ug/L)												
Calcium	7440-70-2	U	2	2	7860	35580	63300	116000	0	<1	No	Essential Nutrient
Calcium	7440-70-2	F	1	1	7020	7020	7020	116000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	U	2	2	804	7352	13900	82000	0	<1	No	Essential Nutrient

Table B-10
Screening-Level Ecological Exposure Estimate for Surface Water
North Percolations Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Magnesium	7439-95-4	F	1	1	384	384	384	82000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	U	2	2	646	730	814	53000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	F	1	1	760	760	760	53000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	U	2	2	5280	6005	6730	680000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	F	1	1	6180	6180	6180	680000	0	<1	No	Essential Nutrient
Pesticides (ug/L)												
Aldrin	309-00-2	U	1	0	---	---	---	0.004	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	U	1	0	---	---	---	2.2	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	U	1	0	---	---	---	0.003	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	U	1	0	---	---	---	2.2	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	U	1	0	---	---	---	0.051	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	U	1	0	---	---	---	0.0043	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	U	1	0	---	---	---	2.2	---	---	No	100% Non-Detect
Dieldrin	60-57-1	U	1	0	---	---	---	0.056	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	U	1	0	---	---	---	0.051	---	---	No	100% Non-Detect
Endrin	72-20-8	U	1	0	---	---	---	0.0023	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	U	1	0	---	---	---	0.036	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	U	1	0	---	---	---	0.036	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	U	1	0	---	---	---	0.01	---	---	No	100% Non-Detect
Heptachlor	76-44-8	U	1	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	U	1	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	U	1	0	---	---	---	0.019	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	U	1	0	---	---	---	0.001	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	U	1	0	---	---	---	0.001	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	U	1	0	---	---	---	0.0005	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	U	1	0	---	---	---	0.0002	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	U	1	0	---	---	---	0.0043	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (ug/L)												
PCB-1016 (Aroclor 1016)	12674-11-2	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	U	1	0	---	---	---	0.000074	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (ug/L)												
2-Methylnaphthalene	91-57-6	U	1	0	---	---	---	4.7	---	---	No	100% Non-Detect
Acenaphthene	83-32-9	U	1	0	---	---	---	5.8	---	---	No	100% Non-Detect
Acenaphthylene	208-96-8	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Anthracene	120-12-7	U	1	0	---	---	---	0.012	---	---	No	100% Non-Detect
Benzo(A)Anthracene	56-55-3	U	1	1	3	3	3	0.018	1	166.7	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	U	1	1	3.9	3.9	3.9	0.014	1	278.6	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	U	1	1	10	10	10	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	U	1	1	3.9	3.9	3.9	NESV	---	---	Yes	No ESV Available
Benzo(K)Fluoranthene	207-08-9	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chrysene	218-01-9	U	1	1	7.6	7.6	7.6	NESV	---	---	Yes	No ESV Available

Table B-10
Screening-Level Ecological Exposure Estimate for Surface Water
North Percolations Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Dibenz(A,H)Anthracene	53-70-3	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Fluoranthene	206-44-0	U	1	1	9.3	9.3	9.3	0.04	1	232.5	Yes	[Maximum] > ESV
Fluorene	86-73-7	U	1	0	---	---	---	3	---	---	No	100% Non-Detect
Indeno(1,2,3-C,D)Pyrene	193-39-5	U	1	1	3.1	3.1	3.1	NESV	---	---	Yes	No ESV Available
Naphthalene	91-20-3	U	1	0	---	---	---	1.1	---	---	No	100% Non-Detect
Phenanthrene	85-01-8	U	1	1	1.5	1.5	1.5	0.4	1	3.8	Yes	[Maximum] > ESV
Pyrene	129-00-0	U	1	1	7	7	7	0.025	1	280	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (ug/L)												
1,2,4,5-Tetrachlorobenzene	95-94-3	U	1	0	---	---	---	3	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	U	1	0	---	---	---	1	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	U	1	0	---	---	---	4.9	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	U	1	0	---	---	---	11	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	U	1	0	---	---	---	44	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	U	1	0	---	---	---	81	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	U	1	0	---	---	---	24	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	U	1	0	---	---	---	13	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	U	1	0	---	---	---	300	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	MEPH3MEPH4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	U	1	0	---	---	---	4.5	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	U	1	0	---	---	---	1.5	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	U	1	0	---	---	---	232	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	U	1	0	---	---	---	60	---	---	No	100% Non-Detect
Acetophenone	98-86-2	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Atrazine	1912-24-9	U	1	0	---	---	---	1.8	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzyl Butyl Phthalate	85-68-7	U	1	0	---	---	---	19	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	U	1	0	---	---	---	14	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	U	1	0	---	---	---	3	---	---	No	100% Non-Detect
Caprolactam	105-60-2	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibenzofuran	132-64-9	U	1	0	---	---	---	3.7	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	U	1	0	---	---	---	210	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	U	1	0	---	---	---	19	---	---	No	100% Non-Detect

Table B-10
Screening-Level Ecological Exposure Estimate for Surface Water
North Percolations Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Di-N-Octylphthalate	117-84-0	U	1	0	---	---	---	22	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	U	1	0	---	---	---	0.0003	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	U	1	0	---	---	---	1.3	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	U	1	0	---	---	---	12	---	---	No	100% Non-Detect
Isophorone	78-59-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	U	1	0	---	---	---	210	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	U	1	0	---	---	---	0.5	---	---	No	100% Non-Detect
Phenol	108-95-2	U	1	0	---	---	---	4	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (ug/L)												
1,1,1-Trichloroethane	71-55-6	U	1	0	---	---	---	11	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	U	1	0	---	---	---	610	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	U	1	0	---	---	---	1200	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	U	1	0	---	---	---	47	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	U	1	0	---	---	---	25	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	U	1	0	---	---	---	8	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	U	1	0	---	---	---	24	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	U	1	0	---	---	---	0.7	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	U	1	0	---	---	---	100	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	U	1	0	---	---	---	71	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	U	1	0	---	---	---	15	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	U	1	0	---	---	---	99	---	---	No	100% Non-Detect
Acetone	67-64-1	U	1	1	12	12	12	1500	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	U	1	0	---	---	---	130	---	---	No	100% Non-Detect
Bromochloromethane	74-97-5	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromoform	75-25-2	U	1	0	---	---	---	320	---	---	No	100% Non-Detect
Bromomethane	74-83-9	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	U	1	0	---	---	---	0.92	---	---	No	100% Non-Detect
Carbon Tetrachloride	56-23-5	U	1	0	---	---	---	9.8	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	U	1	0	---	---	---	1.3	---	---	No	100% Non-Detect
Chloroethane	75-00-3	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	U	1	0	---	---	---	1.8	---	---	No	100% Non-Detect
Chloromethane	74-87-3	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	U	1	0	---	---	---	590	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	U	1	0	---	---	---	0.055	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibromochloromethane	124-48-1	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	U	1	0	---	---	---	7.3	---	---	No	100% Non-Detect
Isopropylbenzene (Cumene)	98-82-8	U	1	0	---	---	---	2.6	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-10
Screening-Level Ecological Exposure Estimate for Surface Water
North Percolations Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methyl Ethyl Ketone (2-Butanone)	78-93-3	U	1	0	---	---	---	14000	---	---	No	100% Non-Detect
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	U	1	0	---	---	---	170	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methylene Chloride	75-09-2	U	1	0	---	---	---	98.1	---	---	No	100% Non-Detect
Styrene	100-42-5	U	1	0	---	---	---	72	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	U	1	0	---	---	---	10000	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	U	1	0	---	---	---	98	---	---	No	100% Non-Detect
Toluene	108-88-3	U	1	0	---	---	---	2	---	---	No	100% Non-Detect
Trans-1,2-Dichloroethene	156-60-5	U	1	0	---	---	---	590	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	U	1	0	---	---	---	0.055	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	U	1	0	---	---	---	21	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	U	1	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	U	1	0	---	---	---	930	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	U	1	0	---	---	---	1.8	---	---	No	100% Non-Detect
O-Xylene (1,2-Dimethylbenzene)	95-47-6	U	1	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - 1/2MDL	1330-20-7	U	1	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - MDL	1330-20-7	U	1	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - Zero	1330-20-7	U	1	0	---	---	---	13	---	---	No	100% Non-Detect
Physicochemical Parameters												
Alkalinity, Total (As CaCO3)	---	U	2	2	13900	115450	217000	NESV	---	---	---	---
Dissolved Oxygen	---	U	2	2	5410	6290	7170	NESV	---	---	---	---
Hardness (As CaCO3)	---	U	2	2	50000	137000	224000	NESV	---	---	---	---
Oxidation-Reduction Potential (mv)	---	U	2	2	177	234	290	NESV	---	---	---	---
pH (s.u.)	---	U	2	2	5.37	6.25	7.14	NESV	---	---	---	---
Specific Conductance (ms/cm)	---	U	2	2	0.119	0.266	0.413	NESV	---	---	---	---
Temperature (°C)	---	U	2	2	5.34	9.64	13.95	NESV	---	---	---	---
Total Dissolved Solids	---	U	2	2	84000	158000	232000	NESV	---	---	---	---
Total Suspended Solids	---	U	2	2	7400	32700	58000	NESV	---	---	---	---
Turbidity (NTU)	---	U	2	2	2.56	10.03	17.5	NESV	---	---	---	---
Other Nutrients (ug/L)												
Nitrogen, Nitrite + Nitrate	NO3NO2N	U	2	2	127	227	327	NESV	---	---	No	Other Nutrient
Phosphorus, Total Orthophosphate (As P)	---	U	2	0	---	---	---	NESV	---	---	No	Other Nutrient
Sulfate (As SO4)	14808-79-8	U	2	2	4390	8795	13200	NESV	---	---	No	Other Nutrient
Sulfide	18496-25-8	U	1	0	---	---	---	NESV	---	---	No	Other Nutrient

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
TCL: Target Compound List
U: Unfiltered
F: Filtered

Table B-11
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	22	22	7520	37392	112000	26000	11	4.3	Yes	[Maximum] > ESV
Antimony	7440-36-0	22	7	0.43	1.45	2.6	2	2	1.3	Yes	[Maximum] > ESV
Arsenic	7440-38-2	22	22	2.5	10.6	26.4	9.79	9	2.7	Yes	[Maximum] > ESV
Barium	7440-39-3	22	22	19.6	197.4	539	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	22	22	0.34	2.62	17.2	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	22	21	0.29	2.56	8.3	0.583	19	14.2	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	24	24	7.2	24.2	53	36.2	5	1.5	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	22	20	0.21	0.62	1.27	NESV	---	---	Yes	No ESV Available
Chromium, Trivalent	16065-83-1	22	22	6.81	21.51	46.23	NESV	---	---	Yes	No ESV Available
Cobalt	7440-48-4	22	22	1.2	7.2	27.4	50	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	22	22	6.4	36.3	83.6	28	12	3	Yes	[Maximum] > ESV
Iron	7439-89-6	22	22	1330	7930	15400	20000	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	22	22	8.3	52.7	238	35.8	7	6.6	Yes	[Maximum] > ESV
Manganese	7439-96-5	22	22	12.8	139.4	479	460	1	1	Yes	[Maximum] > ESV
Mercury	7439-97-6	22	18	0.014	0.04	0.12	0.174	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	22	22	17.9	240	1250	19.5	21	64.1	Yes	[Maximum] > ESV
Selenium	7782-49-2	22	16	0.34	1.23	3.4	2	3	1.7	Yes	[Maximum] > ESV
Silver	7440-22-4	22	2	1	1	1	0.5	2	2	Yes	[Maximum] > ESV
Thallium	7440-28-0	22	19	0.14	0.85	4.6	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	22	22	13.3	76.6	348	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	22	22	42.2	260.4	871	98	20	8.9	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	22	22	0.096	12.525	137	0.0001	22	1370000	Yes	[Maximum] > ESV
Fluoride	16984-48-8	22	22	2.42	96.08	241	290.2	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	22	22	427	20180	106000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	22	22	442	4847	11800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	22	22	101	701	1900	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	22	21	28.4	385	2140	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	9	0	---	---	---	0.002	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	9	0	---	---	---	0.006	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	9	0	---	---	---	0.005	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	9	0	---	---	---	0.138810616	---	---	No	100% Non-Detect
Dieldrin	60-57-1	9	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Endrin	72-20-8	9	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	9	0	---	---	---	0.004428	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	9	0	---	---	---	0.00237	---	---	No	100% Non-Detect

Table B-11
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor	76-44-8	9	0	---	---	---	0.0006	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	9	0	---	---	---	0.00247	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	9	0	---	---	---	0.0136	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	9	0	---	---	---	0.00488	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	9	0	---	---	---	0.00316	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	9	0	---	---	---	0.00416	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	9	0	---	---	---	0.000077	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	11	0	---	---	---	0.032	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	22	18	0.017	1.132	6.9	0.0202	16	341.6	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	22	22	0.031	18.535	190	0.00671	22	28315.9	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	22	6	0.033	0.548	1.2	0.00587	6	204.4	Yes	[Maximum] > ESV
Anthracene	120-12-7	22	22	0.049	29.153	250	0.01	22	25000	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	22	22	0.029	370.351	3700	0.031	21	119354.8	Yes	[Maximum] > ESV
Fluorene	86-73-7	22	19	0.012	9.478	82	0.01	19	8200	Yes	[Maximum] > ESV
Naphthalene	91-20-3	22	16	0.042	1.863	12	0.015	16	800	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	22	22	0.51	121.99	1300	0.019	22	68421.1	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	22	21	2	285	3100	0.032	21	96875	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	22	21	1.7	258.3	2700	0.016	21	168750	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	22	21	5	324	3000	9.79	16	306.4	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	22	21	2.2	211	2200	0.016	21	137500	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	22	21	2.4	206.2	2400	0.24	21	10000	Yes	[Maximum] > ESV
Chrysene	218-01-9	22	21	2.3	287.4	2800	0.027	21	103703.7	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	22	21	0.61	70.26	740	0.01	21	74000	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	22	21	2.7	197	2000	0.017	21	117647.1	Yes	[Maximum] > ESV
Pyrene	129-00-0	22	22	0.058	331.566	3200	0.044	22	72727.3	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	22	22	1.091	2329.252	24694.5	0.26	22	94978.8	Yes	[Maximum] > ESV
Total PAHs - MDL	---	22	22	1.161	2330.88	24727	0.26	22	95103.8	Yes	[Maximum] > ESV
Total PAHs - Zero	---	22	22	1.021	2327.625	24662	0.26	22	94853.8	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	22	0	---	---	---	0.129	---	---	No	100% Non-Detect

Table B-11
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,4,5-Trichlorophenol	95-95-4	22	0	---	---	---	0.288	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	22	0	---	---	---	0.208	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	22	0	---	---	---	0.0817	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	22	0	---	---	---	0.029	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	22	0	---	---	---	0.00621	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	22	0	---	---	---	0.0144	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	22	0	---	---	---	0.0398	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	22	0	---	---	---	0.417	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	22	0	---	---	---	0.02716	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	22	0	---	---	---	0.011856	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	11	0	---	---	---	0.0202	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	22	0	---	---	---	0.127	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	22	0	---	---	---	0.104	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	22	0	---	---	---	0.255	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	22	0	---	---	---	0.388	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	22	1	0.13	0.13	0.13	0.146	0	<1	No	[Maximum] < ESV
4-Chlorophenyl Phenyl Ether	7005-72-3	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	22	0	---	---	---	0.013	---	---	No	100% Non-Detect
Acetophenone	98-86-2	22	1	0.011	0.011	0.011	NESV	---	---	Yes	No ESV Available
Atrazine	1912-24-9	22	0	---	---	---	0.00662	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzyl Butyl Phthalate	85-68-7	22	1	0.55	0.55	0.55	1.97	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	22	3	0.0047	0.2089	0.55	1.22	0	<1	No	[Maximum] < ESV
Bis(2-Chloroethoxy) Methane	111-91-1	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	22	0	---	---	---	3.52	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	22	2	0.17	0.18	0.18	0.18	0	1	No	[Maximum] < ESV
Caprolactam	105-60-2	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	22	21	0.11	16.24	190	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	22	21	0.036	2.659	28	0.300736	12	93.1	Yes	[Maximum] > ESV
Diethyl Phthalate	84-66-2	22	1	0.022	0.022	0.022	0.295	0	<1	No	[Maximum] < ESV
Dimethyl Phthalate	131-11-3	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	22	0	---	---	---	1.1989	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	22	0	---	---	---	16.8858	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	22	0	---	---	---	0.02	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	22	0	---	---	---	0.0265	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	22	0	---	---	---	0.901	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	22	0	---	---	---	0.2136	---	---	No	100% Non-Detect
Isophorone	78-59-1	22	0	---	---	---	0.432	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	22	0	---	---	---	0.145	---	---	No	100% Non-Detect

Table B-11
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
N-Nitrosodi-N-Propylamine	621-64-7	22	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	22	0	---	---	---	0.516	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	22	0	---	---	---	0.504	---	---	No	100% Non-Detect
Phenol	108-95-2	22	0	---	---	---	0.001152	---	---	No	100% Non-Detect
Physicochemical Parameters											
pH (s.u.)	---	11	11	5.57	6.83	7.74	NESV	---	---	---	---
Total Organic Carbon	7440440	13	13	23500	147077	494000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-12
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	38	38	2360	7567	16100	50	38	322	Yes	[Maximum] > ESV
Antimony	7440-36-0	38	1	0.67	0.67	0.67	0.142	1	4.7	Yes	[Maximum] > ESV
Arsenic	7440-38-2	38	35	0.46	1.74	3.7	5.7	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	38	38	43.1	431	972	1.04	38	934.6	Yes	[Maximum] > ESV
Beryllium	7440-41-7	38	29	0.11	0.41	0.79	1.06	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	38	4	0.95	1.51	2.5	0.00222	4	1126.1	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	38	38	2.6	9	32.8	23	1	1.4	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	24	24	0.066	0.251	0.878	0.34	3	2.6	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	24	24	2.53	9.12	31.92	23	1	1.4	Yes	[Maximum] > ESV
Cobalt	7440-48-4	38	36	1.2	3.9	7.2	0.14	36	51.4	Yes	[Maximum] > ESV
Copper	7440-50-8	38	38	3.3	80.8	694	5.4	37	128.5	Yes	[Maximum] > ESV
Iron	7439-89-6	38	38	1490	8008	16300	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	38	38	2.1	14.9	116	0.0537	38	2160.1	Yes	[Maximum] > ESV
Manganese	7439-96-5	38	38	10.7	86.3	226	220	1	1	Yes	[Maximum] > ESV
Mercury	7439-97-6	38	32	0.015	0.134	1.4	0.1	8	14	Yes	[Maximum] > ESV
Nickel	7440-02-0	38	38	4.3	14.4	53.9	10	29	5.4	Yes	[Maximum] > ESV
Selenium	7782-49-2	38	7	0.4	0.8	1.3	0.0276	7	47.1	Yes	[Maximum] > ESV
Silver	7440-22-4	38	3	1.7	9.8	23.5	2	2	11.8	Yes	[Maximum] > ESV
Thallium	7440-28-0	38	1	0.2	0.2	0.2	0.05	1	4	Yes	[Maximum] > ESV
Vanadium	7440-62-2	38	38	2.3	10.8	55.7	1.59	38	35	Yes	[Maximum] > ESV
Zinc	7440-66-6	38	38	13.1	81.1	351	6.62	38	53	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	38	33	0.038	1.243	16.4	0.098	29	167.3	Yes	[Maximum] > ESV
Cyanide (Free)	STL00131	2	1	0.89	0.89	0.89	1.33	0	<1	No	[Maximum] < ESV
Fluoride	16984-48-8	38	34	1.26	19.27	93.7	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	38	38	5140	125544	313000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	38	38	2510	7420	16200	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	38	38	194	678	1790	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	38	31	40.3	173.3	434	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	9	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	9	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	9	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	9	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	9	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	9	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	9	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	9	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	9	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	9	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	9	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-12
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Gamma Bhc (Lindane)	58-89-9	9	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	9	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	9	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	9	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	9	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	9	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	9	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	9	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	9	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	21	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	21	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	21	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	21	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	21	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	21	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	21	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	21	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	21	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	21	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	38	2	0.01	0.01	0.01	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	38	4	0.01	0.01	0.02	0.25	0	<1	No	[Maximum] < ESV
Acenaphthylene	208-96-8	38	0	---	---	---	120	---	---	No	100% Non-Detect
Anthracene	120-12-7	38	6	0.021	0.043	0.096	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	38	35	0.033	0.309	1.3	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	38	2	0.0087	0.0143	0.02	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	38	1	0.015	0.015	0.015	0.0994	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	38	35	0.013	0.133	0.55	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	38	35	0.0955	0.5412	2.485	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	38	35	0.132	0.629	3.12	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	38	35	0.059	0.453	1.85	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	38	31	0.018	0.446	4	1.52	2	2.6	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	38	30	0.04	0.2	0.75	0.73	1	1	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	38	33	0.029	0.711	6.6	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	38	32	0.035	0.46	2.7	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	38	32	0.022	0.143	0.64	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	38	35	0.026	0.405	2.6	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	38	19	0.035	0.117	0.44	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	38	32	0.044	0.486	3.1	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	38	34	0.032	0.277	1.3	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	38	35	0.163	2.997	19.635	1.1	23	17.9	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	38	35	0.221	3.028	20.17	1.1	23	18.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	38	35	0.105	2.967	19.1	1.1	23	17.4	Yes	[Maximum] > ESV

Table B-12
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	38	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	38	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	38	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	38	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	38	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	38	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	38	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	38	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	38	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	38	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	38	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	38	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	38	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	38	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	38	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	32	1	0.13	0.13	0.13	NESV	---	---	Yes	No ESV Available
3,3'-Dichlorobenzidine	91-94-1	38	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	38	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	38	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	38	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	38	4	0.019	0.735	1.9	1	1	1.9	Yes	[Maximum] > ESV
4-Chlorophenyl Phenyl Ether	7005-72-3	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	38	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	38	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	38	0	---	---	---	300	---	---	No	100% Non-Detect
Atrazine	1912-24-9	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	38	1	0.038	0.038	0.038	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	38	0	---	---	---	0.239	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	38	0	---	---	---	60	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	38	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	38	1	0.017	0.017	0.017	23.7	0	<1	No	[Maximum] < ESV
Bis(2-Chloroisopropyl) Ether	108-60-1	38	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	38	5	0.074	0.596	2.2	0.02	5	110	Yes	[Maximum] > ESV
Caprolactam	105-60-2	38	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	38	24	0.011	0.107	0.97	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	38	0	---	---	---	6.1	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	38	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	38	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	38	6	0.019	0.037	0.058	0.011	6	5.3	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	38	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	38	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	38	0	---	---	---	0.0398	---	---	No	100% Non-Detect

Table B-12
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Hexachlorocyclopentadiene	77-47-4	38	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	38	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	38	3	0.0095	0.0178	0.024	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	38	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	38	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	38	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	38	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	38	0	---	---	---	0.79	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	17	0	---	---	---	29.8	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	17	0	---	---	---	0.127	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	17	0	---	---	---	28.6	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	17	0	---	---	---	20.1	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	17	0	---	---	---	8.28	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	17	0	---	---	---	11.1	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	17	0	---	---	---	0.27	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	17	0	---	---	---	0.0352	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	17	0	---	---	---	1.23	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	17	0	---	---	---	0.92	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	17	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	17	0	---	---	---	32.7	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	17	0	---	---	---	0.74	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	17	2	0.00021	0.00047	0.00074	0.546	0	<1	No	[Maximum] < ESV
2-Hexanone	591-78-6	17	0	---	---	---	0.36	---	---	No	100% Non-Detect
Acetone	67-64-1	17	17	0.011	0.074	0.29	1.2	0	<1	No	[Maximum] < ESV
Benzene	71-43-2	17	12	0.0002	0.0007	0.0021	0.255	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	17	0	---	---	---	0.54	---	---	No	100% Non-Detect
Bromoform	75-25-2	17	0	---	---	---	15.9	---	---	No	100% Non-Detect
Bromomethane	74-83-9	17	0	---	---	---	0.235	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	17	16	0.00051	0.00426	0.014	0.0941	0	<1	No	[Maximum] < ESV
Carbon Tetrachloride	56-23-5	17	0	---	---	---	2.98	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	17	0	---	---	---	2.4	---	---	No	100% Non-Detect
Chloroethane	75-00-3	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	17	0	---	---	---	1.19	---	---	No	100% Non-Detect
Chloromethane	74-87-3	17	0	---	---	---	10.4	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	17	0	---	---	---	24	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	17	0	---	---	---	0.398	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	17	7	0.00066	0.00179	0.0046	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	17	0	---	---	---	2.05	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	17	0	---	---	---	39.5	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	17	7	0.00012	0.0005	0.0013	5.16	0	<1	No	[Maximum] < ESV

Table B-12
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Isopropylbenzene (Cumene)	98-82-8	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	17	3	0.0043	0.0071	0.0089	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	17	15	0.0012	0.0161	0.08	89.6	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	17	0	---	---	---	9.7	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	17	9	0.00027	0.00229	0.0081	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	17	1	0.001	0.001	0.001	2.6	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	17	0	---	---	---	1.2	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	17	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	17	0	---	---	---	0.18	---	---	No	100% Non-Detect
Toluene	108-88-3	17	12	0.00044	0.00186	0.0062	5.45	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	17	0	---	---	---	0.784	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	17	0	---	---	---	0.398	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	17	0	---	---	---	12.4	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	17	0	---	---	---	16.4	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	17	0	---	---	---	0.12	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	17	11	0.00025	0.00098	0.0033	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	17	7	0.00011	0.00043	0.0011	NESV	---	---	Yes	No ESV Available
Total Xylene - 1/2MDL	1330-20-7	17	11	0.000305	0.001284	0.0044	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	17	11	0.00036	0.00132	0.0044	1.4	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	1330-20-7	17	11	0.00025	0.00125	0.0044	1.4	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
Moisture, Percent	---	9	9	9.6	87.7	234.1	NESV	---	---	---	---
pH (s.u.)	---	11	11	7.1	7.8	8.6	NESV	---	---	---	---
Total Organic Carbon	7440440	20	20	3520	77716	284000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-13
Screening-Level Ecological Exposure Estimate for Surface Water
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (ug/L)												
Aluminum	7429-90-5	U	26	22	15.3	1760.6	24500	87	13	281.6	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	17	9	42.6	482.7	2360	87	6	27.1	Yes	[Maximum] > ESV
Antimony	7440-36-0	U	26	3	0.69	0.9	1.1	30	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	F	17	0	---	---	---	30	---	---	No	100% Non-Detect
Arsenic	7440-38-2	U	26	7	0.71	2.13	4.4	5	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	F	17	5	1.1	1.8	2.9	3.1	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	U	26	26	156	371	2710	4	26	677.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	17	17	119	259	527	4	17	131.8	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	26	1	1.5	1.5	1.5	0.66	1	2.3	Yes	[Maximum] > ESV
Beryllium	7440-41-7	F	17	0	---	---	---	0.66	---	---	No	100% Non-Detect
Cadmium	7440-43-9	U	26	2	0.66	0.83	1	0.214	1	4.7	Yes	[Maximum] > ESV
Cadmium	7440-43-9	F	17	0	---	---	---	0.214	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	U	26	9	1.8	5.8	27.2	8.9	1	3.1	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	F	17	1	1.5	1.5	1.5	8.9	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	U	26	3	1.5	6.5	15.5	5.1	1	3	Yes	[Maximum] > ESV
Cobalt	7440-48-4	F	17	0	---	---	---	5.1	---	---	No	100% Non-Detect
Copper	7440-50-8	U	26	19	1.6	19.5	183	0.23	19	795.7	Yes	[Maximum] > ESV
Copper	7440-50-8	F	17	7	1.9	8.1	33.4	0.23	7	145.2	Yes	[Maximum] > ESV
Iron	7439-89-6	U	26	23	43.1	1606	22500	300	11	75	Yes	[Maximum] > ESV
Iron	7439-89-6	F	17	10	55.3	354	1430	158	3	9.1	Yes	[Maximum] > ESV
Lead	7439-92-1	U	26	12	0.58	5.05	35.2	5.061	0	7	No	[Maximum] < ESV
Lead	7439-92-1	F	17	6	0.44	1.73	5.2	3.725	0	1.4	No	[Maximum] < ESV
Manganese	7439-96-5	U	26	23	3.2	41.2	337	120	3	2.8	Yes	[Maximum] > ESV
Manganese	7439-96-5	F	17	11	4.5	37.8	243	120	1	2	Yes	[Maximum] > ESV
Mercury	7439-97-6	U	26	1	0.26	0.26	0.26	0.026	1	10	Yes	[Maximum] > ESV
Mercury	7439-97-6	F	17	0	---	---	---	0.026	---	---	No	100% Non-Detect
Nickel	7440-02-0	U	26	8	1.6	10	51.7	71.013	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	F	17	4	1.3	2.2	4.2	5	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	U	26	3	1	1	2	1	1	2	Yes	[Maximum] > ESV
Selenium	7782-49-2	F	17	0	---	---	---	3.1	---	---	No	100% Non-Detect
Silver	7440-22-4	U	26	0	---	---	---	0.25	---	---	No	100% Non-Detect
Silver	7440-22-4	F	17	0	---	---	---	0.12	---	---	No	100% Non-Detect
Thallium	7440-28-0	U	26	1	0.33	0.33	0.33	0.8	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	F	17	0	---	---	---	12	---	---	No	100% Non-Detect
Vanadium	7440-62-2	U	26	8	1.6	5.3	24.8	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	F	17	1	1.3	1.3	1.3	20	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	U	26	11	7.8	37.3	179	163.191	0	1.1	No	[Maximum] < ESV
Zinc	7440-66-6	F	17	3	7	25	59	7	2	8.4	Yes	[Maximum] > ESV
Other Inorganic Parameters (ug/L unless otherwise noted)												
Chloride (As Cl)	16887-00-6	U	26	26	1160	2963	25900	120000	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	U	26	15	3	26	139	5.2	11	26.7	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	5	3	5.3	44.1	68.2	5.2	3	13.1	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	U	16	13	1.8	4.4	10	5	5	2	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	F	3	3	1.7	3	4.9	5	0	<1	No	[Maximum] < ESV
Fluoride	16984-48-8	U	26	26	250	1037	9240	120	26	77	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	3	3	289	818	1860	120	3	15.5	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	26	17	53	740	8550	634.834	1	13.5	Yes	[Maximum] > ESV
Essential Nutrients (ug/L)												
Calcium	7440-70-2	U	26	26	25200	73042	506000	116000	2	4.4	Yes	Essential Nutrient
Calcium	7440-70-2	F	17	17	18900	49247	147000	116000	1	1.3	Yes	Essential Nutrient
Magnesium	7439-95-4	U	26	26	12600	17100	47800	82000	0	<1	No	Essential Nutrient

Table B-13
Screening-Level Ecological Exposure Estimate for Surface Water
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Magnesium	7439-95-4	F	17	17	12500	15859	21900	82000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	U	26	26	600	1426	9100	53000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	F	17	17	618	1518	9310	53000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	U	26	26	4080	12412	51300	680000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	F	17	17	3670	15825	51200	680000	0	<1	No	Essential Nutrient
Pesticides (ug/L)												
Aldrin	309-00-2	U	3	0	---	---	---	0.004	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	U	3	0	---	---	---	2.2	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	U	3	0	---	---	---	0.003	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	U	3	0	---	---	---	2.2	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	U	3	0	---	---	---	0.051	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	U	3	0	---	---	---	0.0043	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	U	3	0	---	---	---	2.2	---	---	No	100% Non-Detect
Dieldrin	60-57-1	U	3	0	---	---	---	0.056	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	U	3	0	---	---	---	0.051	---	---	No	100% Non-Detect
Endrin	72-20-8	U	3	0	---	---	---	0.0023	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	U	3	0	---	---	---	0.036	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	U	3	0	---	---	---	0.036	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	U	3	0	---	---	---	0.01	---	---	No	100% Non-Detect
Heptachlor	76-44-8	U	3	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	U	3	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	U	3	0	---	---	---	0.019	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	U	3	0	---	---	---	0.001	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	U	3	0	---	---	---	0.001	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	U	3	0	---	---	---	0.0005	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	U	3	0	---	---	---	0.0002	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	U	3	0	---	---	---	0.0043	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (ug/L)												
PCB-1016 (Aroclor 1016)	12674-11-2	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	U	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	U	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	U	3	0	---	---	---	0.000074	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (ug/L)												
2-Methylnaphthalene	91-57-6	U	5	0	---	---	---	4.7	---	---	No	100% Non-Detect
Acenaphthene	83-32-9	U	5	0	---	---	---	5.8	---	---	No	100% Non-Detect
Acenaphthylene	208-96-8	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Anthracene	120-12-7	U	5	0	---	---	---	0.012	---	---	No	100% Non-Detect
Benzo(A)Anthracene	56-55-3	U	5	0	---	---	---	0.018	---	---	No	100% Non-Detect
Benzo(A)Pyrene	50-32-8	U	5	1	0.36	0.36	0.36	0.014	1	25.7	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	U	5	1	0.53	0.53	0.53	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzo(K)Fluoranthene	207-08-9	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chrysene	218-01-9	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibenz(A,H)Anthracene	53-70-3	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Fluoranthene	206-44-0	U	5	0	---	---	---	0.04	---	---	No	100% Non-Detect

Table B-13
Screening-Level Ecological Exposure Estimate for Surface Water
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Fluorene	86-73-7	U	5	0	---	---	---	3	---	---	No	100% Non-Detect
Indeno(1,2,3-C,D)Pyrene	193-39-5	U	5	1	0.28	0.28	0.28	NESV	---	---	Yes	No ESV Available
Naphthalene	91-20-3	U	5	0	---	---	---	1.1	---	---	No	100% Non-Detect
Phenanthrene	85-01-8	U	5	0	---	---	---	0.4	---	---	No	100% Non-Detect
Pyrene	129-00-0	U	5	0	---	---	---	0.025	---	---	No	100% Non-Detect
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (ug/L)												
1,2,4,5-Tetrachlorobenzene	95-94-3	U	5	0	---	---	---	3	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	U	5	0	---	---	---	1	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	U	5	0	---	---	---	4.9	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	U	5	0	---	---	---	11	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	U	5	0	---	---	---	44	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	U	5	0	---	---	---	81	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	U	5	0	---	---	---	24	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	U	5	0	---	---	---	13	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	U	5	0	---	---	---	300	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	MEPH3MEPH4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	U	5	0	---	---	---	4.5	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	U	5	0	---	---	---	1.5	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	U	5	0	---	---	---	232	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	U	5	0	---	---	---	60	---	---	No	100% Non-Detect
Acetophenone	98-86-2	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Atrazine	1912-24-9	U	5	0	---	---	---	1.8	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzyl Butyl Phthalate	85-68-7	U	5	0	---	---	---	19	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	U	5	0	---	---	---	14	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	U	5	0	---	---	---	3	---	---	No	100% Non-Detect
Caprolactam	105-60-2	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibenzofuran	132-64-9	U	5	0	---	---	---	3.7	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	U	5	0	---	---	---	210	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	U	5	0	---	---	---	19	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	U	5	1	1.4	1.4	1.4	22	0	<1	No	[Maximum] < ESV
Hexachlorobenzene	118-74-1	U	5	0	---	---	---	0.0003	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	U	5	0	---	---	---	1.3	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	U	5	1	0.26	0.26	0.26	12	0	<1	No	[Maximum] < ESV

Table B-13
Screening-Level Ecological Exposure Estimate for Surface Water
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Isophorone	78-59-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	U	5	0	---	---	---	210	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	U	5	0	---	---	---	0.5	---	---	No	100% Non-Detect
Phenol	108-95-2	U	5	0	---	---	---	4	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (ug/L)												
1,1,1-Trichloroethane	71-55-6	U	5	0	---	---	---	11	---	---	No	100% Non-Detect
1,1,1,2,2-Tetrachloroethane	79-34-5	U	5	0	---	---	---	610	---	---	No	100% Non-Detect
1,1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	U	5	0	---	---	---	1200	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	U	5	0	---	---	---	47	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	U	5	0	---	---	---	25	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	U	5	0	---	---	---	8	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	U	5	0	---	---	---	24	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	U	5	0	---	---	---	0.7	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	U	5	0	---	---	---	100	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	U	5	0	---	---	---	71	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	U	5	0	---	---	---	15	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	U	5	0	---	---	---	99	---	---	No	100% Non-Detect
Acetone	67-64-1	U	5	0	---	---	---	1500	---	---	No	100% Non-Detect
Benzene	71-43-2	U	5	0	---	---	---	130	---	---	No	100% Non-Detect
Bromochloromethane	74-97-5	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromoform	75-25-2	U	5	0	---	---	---	320	---	---	No	100% Non-Detect
Bromomethane	74-83-9	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	U	5	0	---	---	---	0.92	---	---	No	100% Non-Detect
Carbon Tetrachloride	56-23-5	U	5	0	---	---	---	9.8	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	U	5	0	---	---	---	1.3	---	---	No	100% Non-Detect
Chloroethane	75-00-3	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	U	5	0	---	---	---	1.8	---	---	No	100% Non-Detect
Chloromethane	74-87-3	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	U	5	0	---	---	---	590	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	U	5	0	---	---	---	0.055	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibromochloromethane	124-48-1	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	U	5	0	---	---	---	7.3	---	---	No	100% Non-Detect
Isopropylbenzene (Cumene)	98-82-8	U	5	0	---	---	---	2.6	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Ethyl Ketone (2-Butanone)	78-93-3	U	5	0	---	---	---	14000	---	---	No	100% Non-Detect
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	U	5	0	---	---	---	170	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methylene Chloride	75-09-2	U	5	2	0.47	0.68	0.9	98.1	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	U	5	0	---	---	---	72	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	U	5	0	---	---	---	10000	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	U	5	0	---	---	---	98	---	---	No	100% Non-Detect
Toluene	108-88-3	U	5	0	---	---	---	2	---	---	No	100% Non-Detect

Table B-13
Screening-Level Ecological Exposure Estimate for Surface Water
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Trans-1,2-Dichloroethene	156-60-5	U	5	0	---	---	---	590	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	U	5	0	---	---	---	0.055	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	U	5	0	---	---	---	21	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	U	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	U	5	0	---	---	---	930	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	U	5	0	---	---	---	1.8	---	---	No	100% Non-Detect
O-Xylene (1,2-Dimethylbenzene)	95-47-6	U	5	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - 1/2MDL	1330-20-7	U	5	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - MDL	1330-20-7	U	5	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - Zero	1330-20-7	U	5	0	---	---	---	13	---	---	No	100% Non-Detect
Physicochemical Parameters												
Alkalinity, Total (As CaCO3)	---	U	26	26	116000	195346	335000	NESV	---	---	---	---
Dissolved Organic Carbon	---	F	15	15	1030	4106	13300	NESV	---	---	---	---
Dissolved Oxygen	---	U	26	26	770	10674	36890	NESV	---	---	---	---
Hardness (As CaCO3)	---	U	26	26	144000	256769	1740000	NESV	---	---	---	---
Oxidation-Reduction Potential (mv)	---	U	26	26	-31	141	277	NESV	---	---	---	---
pH (s.u.)	---	U	25	25	6.34	7.65	8.64	NESV	---	---	---	---
Specific Conductance (ms/cm)	---	U	26	26	0.138	0.336	0.656	NESV	---	---	---	---
Temperature (°C)	---	U	26	26	0.71	9.5	17.61	NESV	---	---	---	---
Total Organic Carbon	---	U	12	12	830	3825	13600	NESV	---	---	---	---
Total Dissolved Solids	---	U	24	24	134000	207417	350000	NESV	---	---	---	---
Total Suspended Solids	---	U	24	24	1400	66358	399000	NESV	---	---	---	---
Turbidity (NTU)	---	U	25	25	0	88	1000	NESV	---	---	---	---
Other Nutrients (ug/L)												
Nitrogen, Nitrite + Nitrate	NO3NO2N	U	26	14	117	408	2060	NESV	---	---	No	Other Nutrient
Phosphorus, Total Orthophosphate (As P)	---	U	23	0	---	---	---	NESV	---	---	No	Other Nutrient
Sulfate (As SO4)	14808-79-8	U	26	26	3140	6633	20600	NESV	---	---	No	Other Nutrient
Sulfide	18496-25-8	U	15	0	---	---	---	NESV	---	---	No	Other Nutrient

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
TCL: Target Compound List
U: Unfiltered
F: Filtered

Table B-14
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	26	26	2360	7919	16100	26000	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	26	1	0.67	0.67	0.67	2	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	26	24	0.46	1.72	3.7	9.79	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	26	26	52.3	552.2	972	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	26	17	0.16	0.45	0.79	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	26	3	0.95	1.52	2.5	0.583	3	4.3	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	26	26	2.6	9.5	32.8	36.2	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	12	12	0.07	0.29	0.88	NESV	---	---	Yes	No ESV Available
Chromium, Trivalent	16065-83-1	12	12	2.53	10.47	31.92	NESV	---	---	Yes	No ESV Available
Cobalt	7440-48-4	26	24	1.2	3.9	7.2	50	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	26	26	9	87	694	28	19	24.8	Yes	[Maximum] > ESV
Iron	7439-89-6	26	26	1490	7202	15300	20000	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	26	26	3.4	16.1	116	35.8	1	3.2	Yes	[Maximum] > ESV
Manganese	7439-96-5	26	26	14.8	89.9	226	460	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	26	22	0.016	0.135	1.4	0.174	3	8	Yes	[Maximum] > ESV
Nickel	7440-02-0	26	26	4.4	15.9	53.9	19.5	4	2.8	Yes	[Maximum] > ESV
Selenium	7782-49-2	26	6	0.4	0.8	1.3	2	0	<1	No	[Maximum] < ESV
Silver	7440-22-4	26	2	1.7	12.6	23.5	0.5	2	47	Yes	[Maximum] > ESV
Thallium	7440-28-0	26	1	0.2	0.2	0.2	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	26	26	2.3	9.9	26.2	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	26	26	16.3	89.3	351	98	7	3.6	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	26	22	0.12	1.72	16.4	0.0001	22	164000	Yes	[Maximum] > ESV
Cyanide (Free)	STL00131	2	1	0.89	0.89	0.89	NESV	---	---	Yes	No ESV Available
Fluoride	16984-48-8	26	22	1.8	23.7	93.7	290.2	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	26	26	8540	164548	313000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	26	26	2510	7771	16200	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	26	26	228	740	1790	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	26	22	54.3	204.7	434	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	9	0	---	---	---	0.002	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	9	0	---	---	---	0.006	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	9	0	---	---	---	0.005	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	9	0	---	---	---	0.138810616	---	---	No	100% Non-Detect
Dieldrin	60-57-1	9	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Endrin	72-20-8	9	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	9	0	---	---	---	0.004428	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-14
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Gamma Bhc (Lindane)	58-89-9	9	0	---	---	---	0.00237	---	---	No	100% Non-Detect
Heptachlor	76-44-8	9	0	---	---	---	0.0006	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	9	0	---	---	---	0.00247	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	9	0	---	---	---	0.0136	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	9	0	---	---	---	0.00488	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	9	0	---	---	---	0.00316	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	9	0	---	---	---	0.00416	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	9	0	---	---	---	0.000077	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	12	0	---	---	---	0.032	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	26	1	0.01	0.01	0.01	0.0202	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	26	3	0.01	0.01	0.02	0.00671	3	3	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	26	0	---	---	---	0.00587	---	---	No	100% Non-Detect
Anthracene	120-12-7	26	5	0.021	0.041	0.096	0.01	5	9.6	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	26	25	0.053	0.359	1.3	0.031	25	41.9	Yes	[Maximum] > ESV
Fluorene	86-73-7	26	2	0.0087	0.0143	0.02	0.01	1	2	Yes	[Maximum] > ESV
Naphthalene	91-20-3	26	1	0.015	0.015	0.015	0.015	0	1	No	[Maximum] < ESV
Phenanthrene	85-01-8	26	25	0.037	0.155	0.55	0.019	25	28.9	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	26	23	0.059	0.401	2.8	0.032	23	87.5	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	26	24	0.042	0.196	0.57	0.016	24	35.6	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	26	24	0.084	0.724	6.6	9.79	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	26	24	0.045	0.48	2.7	0.016	24	168.8	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	26	24	0.022	0.171	0.64	0.24	4	2.7	Yes	[Maximum] > ESV
Chrysene	218-01-9	26	25	0.067	0.455	2.6	0.027	25	96.3	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	26	16	0.035	0.097	0.28	0.01	16	28	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	26	24	0.06	0.49	3.1	0.017	24	182.4	Yes	[Maximum] > ESV
Pyrene	129-00-0	26	24	0.058	0.314	1.3	0.044	24	29.5	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	26	25	0.4589	3.1138	15.455	0.26	25	59.4	Yes	[Maximum] > ESV
Total PAHs - MDL	---	26	25	0.5208	3.2308	16.56	0.26	25	63.7	Yes	[Maximum] > ESV
Total PAHs - Zero	---	26	25	0.397	2.997	14.35	0.26	25	55.2	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	26	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-14
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,3,4,6-Tetrachlorophenol	58-90-2	26	0	---	---	---	0.129	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	26	0	---	---	---	0.288	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	26	0	---	---	---	0.208	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	26	0	---	---	---	0.0817	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	26	0	---	---	---	0.029	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	26	0	---	---	---	0.00621	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	26	0	---	---	---	0.0144	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	26	0	---	---	---	0.0398	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	26	0	---	---	---	0.417	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	26	0	---	---	---	0.02716	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	26	0	---	---	---	0.011856	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	20	1	0.13	0.13	0.13	0.0202	1	6.4	Yes	[Maximum] > ESV
3,3'-Dichlorobenzidine	91-94-1	26	0	---	---	---	0.127	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	26	0	---	---	---	0.104	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	26	0	---	---	---	0.255	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	26	0	---	---	---	0.388	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	26	2	0.13	1.01	1.9	0.146	1	13	Yes	[Maximum] > ESV
4-Chlorophenyl Phenyl Ether	7005-72-3	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	26	0	---	---	---	0.013	---	---	No	100% Non-Detect
Acetophenone	98-86-2	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
Atrazine	1912-24-9	26	0	---	---	---	0.00662	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	26	1	0.038	0.038	0.038	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	26	0	---	---	---	1.97	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	26	0	---	---	---	1.22	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	26	1	0.017	0.017	0.017	3.52	0	<1	No	[Maximum] < ESV
Bis(2-Chloroisopropyl) Ether	108-60-1	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	26	2	0.074	0.297	0.52	0.18	1	2.9	Yes	[Maximum] > ESV
Caprolactam	105-60-2	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	26	18	0.016	0.113	0.97	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	26	0	---	---	---	0.300736	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	26	0	---	---	---	0.295	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	26	3	0.019	0.037	0.058	1.1989	0	<1	No	[Maximum] < ESV
Di-N-Octylphthalate	117-84-0	26	0	---	---	---	16.8858	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	26	0	---	---	---	0.02	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	26	0	---	---	---	0.0265	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	26	0	---	---	---	0.901	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	26	0	---	---	---	0.2136	---	---	No	100% Non-Detect
Isophorone	78-59-1	26	2	0.02	0.02	0.02	0.432	0	<1	No	[Maximum] < ESV

Table B-14
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Nitrobenzene	98-95-3	26	0	---	---	---	0.145	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	26	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	26	0	---	---	---	0.516	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	26	0	---	---	---	0.504	---	---	No	100% Non-Detect
Phenol	108-95-2	26	0	---	---	---	0.001152	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	5	0	---	---	---	0.0302	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	5	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	5	0	---	---	---	0.518	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	5	0	---	---	---	0.000575	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	5	0	---	---	---	0.0194	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	5	0	---	---	---	0.858	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	5	0	---	---	---	2.1	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	5	0	---	---	---	0.0165	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	5	0	---	---	---	0.26	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	5	0	---	---	---	0.333	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	5	0	---	---	---	1.315	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	5	0	---	---	---	0.318	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	5	0	---	---	---	0.0582	---	---	No	100% Non-Detect
Acetone	67-64-1	5	5	0.075	0.167	0.29	0.0099	5	29.3	Yes	[Maximum] > ESV
Benzene	71-43-2	5	1	0.0021	0.0021	0.0021	0.14157	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromoform	75-25-2	5	0	---	---	---	0.492	---	---	No	100% Non-Detect
Bromomethane	74-83-9	5	0	---	---	---	0.00137	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	5	5	0.0013	0.0051	0.011	0.000851	5	12.9	Yes	[Maximum] > ESV
Carbon Tetrachloride	56-23-5	5	0	---	---	---	0.0642	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	5	0	---	---	---	0.00842	---	---	No	100% Non-Detect
Chloroethane	75-00-3	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	5	0	---	---	---	0.121	---	---	No	100% Non-Detect
Chloromethane	74-87-3	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	5	0	---	---	---	0.26	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	5	2	0.00093	0.00276	0.0046	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	5	1	0.0013	0.0013	0.0013	0.175	0	<1	No	[Maximum] < ESV
Isopropylbenzene (Cumene)	98-82-8	5	0	---	---	---	0.086	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Ethyl Ketone (2-Butanone)	78-93-3	5	5	0.013	0.038	0.08	0.0424	2	1.9	Yes	[Maximum] > ESV

Table B-14
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	5	0	---	---	---	0.0251	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	5	2	0.0014	0.0047	0.0081	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	5	1	0.001	0.001	0.001	0.159	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	5	0	---	---	---	0.254	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	5	0	---	---	---	0.468	---	---	No	100% Non-Detect
Toluene	108-88-3	5	2	0.0027	0.0044	0.0062	1.22	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	5	0	---	---	---	0.654	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	5	0	---	---	---	0.0969	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	5	0	---	---	---	0.202	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	5	2	0.00077	0.00203	0.0033	0.0252	0	<1	No	[Maximum] < ESV
O-Xylene (1,2-Dimethylbenzene)	95-47-6	5	1	0.0011	0.0011	0.0011	0.433	0	<1	No	[Maximum] < ESV
Total Xylene - 1/2MDL	1330-20-7	5	2	0.000945	0.002672	0.0044	0.433	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	5	2	0.00112	0.00276	0.0044	0.433	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	1330-20-7	5	2	0.00077	0.00258	0.0044	0.433	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
Moisture, Percent	---	6	6	9.6	120.4	234.1	NESV	---	---	---	---
pH (s.u.)	---	8	8	7.1	7.6	8.4	NESV	---	---	---	---
Total Organic Carbon	7440440	17	17	15100	78453	284000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-15
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	8	8	14700	17950	22700	50	8	454	Yes	[Maximum] > ESV
Antimony	7440-36-0	8	0	---	---	---	0.142	---	---	No	100% Non-Detect
Arsenic	7440-38-2	8	8	4.1	5.9	7.8	5.7	4	1.4	Yes	[Maximum] > ESV
Barium	7440-39-3	8	8	148	240	295	1.04	8	283.7	Yes	[Maximum] > ESV
Beryllium	7440-41-7	8	8	0.46	0.75	1	1.06	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	8	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	8	8	11.1	13	15	23	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	3	3	0.30	0.3	0.4	0.34	1	1.1	Yes	[Maximum] > ESV
Chromium, Trivalent	16065-83-1	3	3	10.80	11.9	13.7	23	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	8	8	5.8	7.6	9	0.14	8	64.3	Yes	[Maximum] > ESV
Copper	7440-50-8	8	8	18.6	22	27.8	5.4	8	5.1	Yes	[Maximum] > ESV
Iron	7439-89-6	8	8	14100	17313	20000	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	8	8	13	15	19	0.0537	8	344.5	Yes	[Maximum] > ESV
Manganese	7439-96-5	8	8	517	1070	1640	220	8	7.5	Yes	[Maximum] > ESV
Mercury	7439-97-6	8	8	0.028	0.036	0.045	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	8	8	16	26	44	10	8	4.4	Yes	[Maximum] > ESV
Selenium	7782-49-2	8	6	0.34	0.64	1.4	0.0276	6	50.7	Yes	[Maximum] > ESV
Silver	7440-22-4	8	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	8	0	---	---	---	0.05	---	---	No	100% Non-Detect
Vanadium	7440-62-2	8	8	11.1	13.2	18	1.59	8	11.3	Yes	[Maximum] > ESV
Zinc	7440-66-6	8	8	59	92	129	6.62	8	19.5	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	8	8	0.12	0.53	1.5	0.098	8	15.3	Yes	[Maximum] > ESV
Fluoride	16984-48-8	8	8	1.3	2	4.3	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	8	8	8370	19034	30100	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	8	8	8110	10608	12200	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	8	8	872	1215	1700	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	8	5	60	105	171	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	5	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	5	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	5	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	5	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	5	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	5	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	5	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	5	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	5	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	5	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	5	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	5	0	---	---	---	0.005	---	---	No	100% Non-Detect

Table B-15
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor	76-44-8	5	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	5	0	---	---	---	0.152	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	5	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	5	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	5	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	5	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	5	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	5	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	5	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	5	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	5	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	5	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	5	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	5	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	8	3	0.0088	0.0119	0.015	3.24	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	8	6	0.034	0.055	0.075	0.25	0	<1	No	[Maximum] < ESV
Acenaphthylene	208-96-8	8	0	---	---	---	120	---	---	No	100% Non-Detect
Anthracene	120-12-7	8	6	0.066	0.107	0.14	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	8	8	0.13	0.93	1.8	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	8	6	0.022	0.035	0.053	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	8	6	0.013	0.023	0.045	0.0994	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	8	8	0.065	0.475	0.81	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	8	8	0.23745	1.59287	2.89995	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	8	8	0.2799	1.6119	2.9031	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	8	8	0.195	1.574	2.897	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	8	8	0.11	0.75	1.4	1.52	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	8	8	0.093	0.564	1	0.73	3	1.4	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	8	8	0.19	1.08	1.8	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	8	8	0.11	0.74	1.3	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	8	8	0.051	0.384	0.75	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	8	8	0.13	0.81	1.4	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	8	6	0.14	0.21	0.28	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	8	8	0.11	0.69	1.3	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	8	8	0.13	0.97	1.5	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	8	8	0.9595	6.1449	10.28	1.1	6	9.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	8	8	0.975	6.148	10.28	1.1	6	9.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	8	8	0.944	6.142	10.28	1.1	6	9.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											

Table B-15
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
1,2,4,5-Tetrachlorobenzene	95-94-3	8	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	8	0	---	---	---	2.05	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	8	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	8	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	8	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	8	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	8	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	8	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	8	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	8	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	8	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	8	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	8	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	8	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	8	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	8	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	8	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	8	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	8	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	8	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	8	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	8	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	8	1	0.011	0.011	0.011	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	8	2	0.056	0.062	0.069	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	8	1	0.031	0.031	0.031	0.239	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	8	0	---	---	---	60	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	8	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	8	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	8	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	8	1	0.045	0.045	0.045	0.02	1	2.3	Yes	[Maximum] > ESV
Caprolactam	105-60-2	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	8	8	0.011	0.095	0.18	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	8	5	0.014	0.021	0.029	6.1	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	8	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	8	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	8	1	0.039	0.039	0.039	0.011	1	3.5	Yes	[Maximum] > ESV
Di-N-Octylphthalate	117-84-0	8	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	8	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	8	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	8	0	---	---	---	0.755	---	---	No	100% Non-Detect

Table B-15
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-2 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Hexachloroethane	67-72-1	8	0	---	---	---	0.596	---	---	No	100% Non-Detect
Isophorone	78-59-1	8	4	0.012	0.014	0.016	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	8	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	8	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	8	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	8	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	8	0	---	---	---	0.79	---	---	No	100% Non-Detect
Physicochemical Parameters											
pH (s.u.)	---	3	3	6.9	7.4	7.7	NESV	---	---	---	---
Total Organic Carbon	7440440	8	7	28600	73157	183000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-16
Screening-Level Ecological Exposure Estimate for Surface Water
Cedar Creek Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (ug/L)												
Aluminum	7429-90-5	U	27	20	16.7	133.6	1610	87	2	18.5	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	16	1	36.1	36.1	36.1	87	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	U	27	2	2	2	2	30	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	F	16	0	---	---	---	30	---	---	No	100% Non-Detect
Arsenic	7440-38-2	U	27	5	0.79	1.31	2.2	5	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	F	16	1	0.69	0.69	0.69	3.1	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	U	27	27	63.4	90.8	209	4	27	52.3	Yes	[Maximum] > ESV
Barium	7440-39-3	F	16	16	69.9	91	218	4	16	54.5	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	27	0	---	---	---	0.66	---	---	No	100% Non-Detect
Beryllium	7440-41-7	F	16	0	---	---	---	0.66	---	---	No	100% Non-Detect
Cadmium	7440-43-9	U	27	0	---	---	---	0.207	---	---	No	100% Non-Detect
Cadmium	7440-43-9	F	16	0	---	---	---	0.228	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	U	27	1	1.4	1.4	1.4	8.9	0	<1	No	[Maximum] < ESV
Chromium, Total	7440-47-3	F	16	0	---	---	---	8.9	---	---	No	100% Non-Detect
Cobalt	7440-48-4	U	27	1	2.4	2.4	2.4	5.1	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	F	16	0	---	---	---	5.1	---	---	No	100% Non-Detect
Copper	7440-50-8	U	27	9	1.5	3.7	7.2	0.23	9	31.3	Yes	[Maximum] > ESV
Copper	7440-50-8	F	16	0	---	---	---	0.23	---	---	No	100% Non-Detect
Iron	7439-89-6	U	27	5	49.3	696.3	2910	300	2	9.7	Yes	[Maximum] > ESV
Iron	7439-89-6	F	16	0	---	---	---	158	---	---	No	100% Non-Detect
Lead	7439-92-1	U	27	2	0.54	1.32	2.1	4.794	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	F	16	0	---	---	---	4.032	---	---	No	100% Non-Detect
Manganese	7439-96-5	U	27	26	3	150	3750	120	1	31.3	Yes	[Maximum] > ESV
Manganese	7439-96-5	F	16	3	3.2	6.9	14	120	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	U	27	0	---	---	---	0.026	---	---	No	100% Non-Detect
Mercury	7439-97-6	F	16	0	---	---	---	0.026	---	---	No	100% Non-Detect
Nickel	7440-02-0	U	27	1	2.3	2.3	2.3	68.502	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	F	16	0	---	---	---	5	---	---	No	100% Non-Detect
Selenium	7782-49-2	U	27	0	---	---	---	1	---	---	No	100% Non-Detect
Selenium	7782-49-2	F	16	0	---	---	---	3.1	---	---	No	100% Non-Detect
Silver	7440-22-4	U	27	0	---	---	---	0.25	---	---	No	100% Non-Detect
Silver	7440-22-4	F	16	0	---	---	---	0.12	---	---	No	100% Non-Detect
Thallium	7440-28-0	U	27	0	---	---	---	0.8	---	---	No	100% Non-Detect
Thallium	7440-28-0	F	16	0	---	---	---	12	---	---	No	100% Non-Detect
Vanadium	7440-62-2	U	27	6	1.9	2.1	2.2	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	F	16	0	---	---	---	20	---	---	No	100% Non-Detect
Zinc	7440-66-6	U	27	3	7.1	13.4	18.9	157.411	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	F	16	0	---	---	---	7	---	---	No	100% Non-Detect
Other Inorganic Parameters (ug/L unless otherwise noted)												
Chloride (As Cl)	16887-00-6	U	27	27	320	1598	2640	120000	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	U	26	0	---	---	---	5.2	---	---	No	100% Non-Detect
Cyanide	57-12-5	F	5	0	---	---	---	5.2	---	---	No	100% Non-Detect
Cyanide (Free)	FREE CN	U	11	3	1.6	3.3	5.8	5	1	1.2	Yes	[Maximum] > ESV
Fluoride	16984-48-8	U	27	27	38.7	220.2	2600	120	9	21.7	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	5	5	126	149	185	120	5	1.5	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	27	3	48.9	73	97.3	514.428	0	<1	No	[Maximum] < ESV
Essential Nutrients (ug/L)												
Calcium	7440-70-2	U	27	27	38300	46952	59000	116000	0	<1	No	Essential Nutrient

Table B-16
Screening-Level Ecological Exposure Estimate for Surface Water
Cedar Creek Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Calcium	7440-70-2	F	16	16	44200	48138	57500	116000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	U	27	27	6510	11341	18500	82000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	F	16	16	9720	11144	19200	82000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	U	27	27	368	501	1100	53000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	F	16	16	410	463	844	53000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	U	27	27	1410	2351	4830	680000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	F	16	16	1730	1991	3100	680000	0	<1	No	Essential Nutrient
Physicochemical Parameters (ug/L unless otherwise noted)												
Alkalinity, Total (As CaCO3)	---	U	27	27	133000	167815	236000	NESV	---	---	---	---
Dissolved Organic Carbon	---	F	16	16	1200	1377	2330	NESV	---	---	---	---
Dissolved Oxygen	---	U	27	27	7640	10664	16060	NESV	---	---	---	---
Hardness (As CaCO3)	---	U	27	27	138000	164815	204000	NESV	---	---	---	---
Oxidation-Reduction Potential (mv)	---	U	27	27	63	172	234	NESV	---	---	---	---
pH (s.u.)	---	U	25	25	6.29	7.65	8.39	NESV	---	---	---	---
Specific Conductance (ms/cm)	---	U	27	27	0.171	0.307	0.494	NESV	---	---	---	---
Temperature (°C)	---	U	27	27	1.86	10.42	17.37	NESV	---	---	---	---
Total Organic Carbon	---	U	11	11	1200	1236	1300	NESV	---	---	---	---
Total Dissolved Solids	---	U	27	27	139000	178519	243000	NESV	---	---	---	---
Total Suspended Solids	---	U	27	12	1000	15708	153000	NESV	---	---	---	---
Turbidity (NTU)	---	U	25	25	0	7	84	NESV	---	---	---	---
Other Nutrients (ug/L)												
Nitrogen, Nitrite + Nitrate	NO3NO2N	U	27	3	113	149	216	NESV	---	---	No	Other Nutrient
Phosphorus, Total Orthophosphate (As P)	---	U	20	7	137	144	158	NESV	---	---	No	Other Nutrient
Sulfate (As SO4)	14808-79-8	U	27	27	1540	2378	8230	NESV	---	---	No	Other Nutrient
Sulfide	18496-25-8	U	16	0	---	---	---	NESV	---	---	No	Other Nutrient

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
F: Filtered

Table B-17
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	8	8	14700	17950	22700	26000	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	8	0	---	---	---	2	---	---	No	100% Non-Detect
Arsenic	7440-38-2	8	8	4.1	5.9	7.8	9.79	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	8	8	148	240	295	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	8	8	0.46	0.75	1	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	8	0	---	---	---	0.583	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	8	8	11.1	13	15	36.2	0	<1	No	[Maximum] < ESV
Chromium, Hexavalent	18540-29-9	3	3	0.3	0.3	0.4	NESV	---	---	Yes	No ESV Available
Chromium, Trivalent	16065-83-1	3	3	10.8	11.9	13.7	NESV	---	---	Yes	No ESV Available
Cobalt	7440-48-4	8	8	5.8	7.6	9	50	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	8	8	18.6	22	27.8	28	0	<1	No	[Maximum] < ESV
Iron	7439-89-6	8	8	14100	17313	20000	20000	0	1	No	[Maximum] < ESV
Lead	7439-92-1	8	8	13	15	19	35.8	0	<1	No	[Maximum] < ESV
Manganese	7439-96-5	8	8	517	1070	1640	460	8	3.6	Yes	[Maximum] > ESV
Mercury	7439-97-6	8	8	0.028	0.036	0.045	0.174	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	8	8	16	26	44	19.5	5	2.2	Yes	[Maximum] > ESV
Selenium	7782-49-2	8	6	0.34	0.64	1.4	2	0	<1	No	[Maximum] < ESV
Silver	7440-22-4	8	0	---	---	---	0.5	---	---	No	100% Non-Detect
Thallium	7440-28-0	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vanadium	7440-62-2	8	8	11.1	13.2	18	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	8	8	59	92	129	98	3	1.3	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	8	8	0.12	0.53	1.5	0.0001	8	15000	Yes	[Maximum] > ESV
Fluoride	16984-48-8	8	8	1.3	2	4.3	290.2	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	8	8	8370	19034	30100	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	8	8	8110	10608	12200	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	8	8	872	1215	1700	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	8	5	60	105	171	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	5	0	---	---	---	0.002	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	5	0	---	---	---	0.006	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	5	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	5	0	---	---	---	0.005	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	5	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	5	0	---	---	---	0.138810616	---	---	No	100% Non-Detect
Dieldrin	60-57-1	5	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	5	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Endrin	72-20-8	5	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	5	0	---	---	---	0.004428	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	5	0	---	---	---	0.00237	---	---	No	100% Non-Detect

Table B-17
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor	76-44-8	5	0	---	---	---	0.0006	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	5	0	---	---	---	0.00247	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	5	0	---	---	---	0.0136	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	5	0	---	---	---	0.00488	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	5	0	---	---	---	0.00316	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	5	0	---	---	---	0.00416	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	5	0	---	---	---	0.000077	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	5	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	5	0	---	---	---	0.032	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	8	3	0.0088	0.0119	0.015	0.0202	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	8	6	0.034	0.055	0.075	0.00671	6	11.2	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	8	0	---	---	---	0.00587	---	---	No	100% Non-Detect
Anthracene	120-12-7	8	6	0.066	0.107	0.14	0.01	6	14	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	8	8	0.13	0.93	1.8	0.031	8	58.1	Yes	[Maximum] > ESV
Fluorene	86-73-7	8	6	0.022	0.035	0.053	0.01	6	5.3	Yes	[Maximum] > ESV
Naphthalene	91-20-3	8	6	0.013	0.023	0.045	0.015	4	3	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	8	8	0.065	0.475	0.81	0.019	8	42.6	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	8	8	0.11	0.75	1.4	0.032	8	43.8	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	8	8	0.093	0.564	1	0.016	8	62.5	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	8	8	0.19	1.08	1.8	9.79	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	8	8	0.11	0.74	1.3	0.016	8	81.3	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	8	8	0.051	0.384	0.75	0.24	6	3.1	Yes	[Maximum] > ESV
Chrysene	218-01-9	8	8	0.13	0.81	1.4	0.027	8	51.9	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	8	6	0.14	0.21	0.28	0.01	6	28	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	8	8	0.11	0.69	1.3	0.017	8	76.5	Yes	[Maximum] > ESV
Pyrene	129-00-0	8	8	0.13	0.97	1.5	0.044	8	34.1	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	8	8	1.0335	6.6549	11.4711	0.26	8	44.1	Yes	[Maximum] > ESV
Total PAHs - MDL	---	8	8	1.106	6.674	11.474	0.26	8	44.1	Yes	[Maximum] > ESV
Total PAHs - Zero	---	8	8	0.961	6.636	11.468	0.26	8	44.1	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	8	0	---	---	---	0.129	---	---	No	100% Non-Detect

Table B-17
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,4,5-Trichlorophenol	95-95-4	8	0	---	---	---	0.288	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	8	0	---	---	---	0.208	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	8	0	---	---	---	0.0817	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	8	0	---	---	---	0.029	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	8	0	---	---	---	0.00621	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	8	0	---	---	---	0.0144	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	8	0	---	---	---	0.0398	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	8	0	---	---	---	0.417	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	8	0	---	---	---	0.02716	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	8	0	---	---	---	0.011856	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	5	0	---	---	---	0.0202	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	8	0	---	---	---	0.127	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	8	0	---	---	---	0.104	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	8	0	---	---	---	0.255	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	8	0	---	---	---	0.388	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	8	0	---	---	---	0.146	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	8	0	---	---	---	0.013	---	---	No	100% Non-Detect
Acetophenone	98-86-2	8	1	0.011	0.011	0.011	NESV	---	---	Yes	No ESV Available
Atrazine	1912-24-9	8	0	---	---	---	0.00662	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	8	2	0.056	0.062	0.069	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	8	1	0.031	0.031	0.031	1.97	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	8	0	---	---	---	1.22	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	8	0	---	---	---	3.52	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	8	1	0.045	0.045	0.045	0.18	0	<1	No	[Maximum] < ESV
Caprolactam	105-60-2	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	8	8	0.011	0.095	0.18	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	8	5	0.014	0.021	0.029	0.300736	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	8	0	---	---	---	0.295	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	8	1	0.039	0.039	0.039	1.1989	0	<1	No	[Maximum] < ESV
Di-N-Octylphthalate	117-84-0	8	0	---	---	---	16.8858	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	8	0	---	---	---	0.02	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	8	0	---	---	---	0.0265	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	8	0	---	---	---	0.901	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	8	0	---	---	---	0.2136	---	---	No	100% Non-Detect
Isophorone	78-59-1	8	4	0.012	0.014	0.016	0.432	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	8	0	---	---	---	0.145	---	---	No	100% Non-Detect

Table B-17
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
N-Nitrosodi-N-Propylamine	621-64-7	8	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	8	0	---	---	---	0.516	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	8	0	---	---	---	0.504	---	---	No	100% Non-Detect
Phenol	108-95-2	8	0	---	---	---	0.001152	---	---	No	100% Non-Detect
Physicochemical Parameters											
pH (s.u.)	---	3	3	6.9	7.4	7.7	NESV	---	---	---	---
Total Organic Carbon	7440440	8	7	28600	73157	183000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-18
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	12	12	12100	20617	35400	50	12	708	Yes	[Maximum] > ESV
Antimony	7440-36-0	12	0	---	---	---	0.142	---	---	No	100% Non-Detect
Arsenic	7440-38-2	12	12	3.2	7.4	14.5	5.7	7	2.5	Yes	[Maximum] > ESV
Barium	7440-39-3	12	12	136	448	905	1.04	12	870.2	Yes	[Maximum] > ESV
Beryllium	7440-41-7	12	10	0.32	0.67	1.1	1.06	2	1	Yes	[Maximum] > ESV
Cadmium	7440-43-9	12	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	12	12	5	10	20	23	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	12	12	1.9	4.8	6.6	0.14	12	47.1	Yes	[Maximum] > ESV
Copper	7440-50-8	12	12	10.1	20.4	42.5	5.4	12	7.9	Yes	[Maximum] > ESV
Iron	7439-89-6	12	12	7770	14242	25200	NESV	---	---	Yes	No ESV Available
Lead	7439-92-1	12	12	6.1	11.6	17.6	0.0537	12	327.7	Yes	[Maximum] > ESV
Manganese	7439-96-5	12	12	34.1	317.6	988	220	6	4.5	Yes	[Maximum] > ESV
Mercury	7439-97-6	12	6	0.012	0.03	0.062	0.1	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	12	12	6	11	15	10	6	1.5	Yes	[Maximum] > ESV
Selenium	7782-49-2	12	4	0.57	2.07	4.4	0.0276	4	159.4	Yes	[Maximum] > ESV
Silver	7440-22-4	12	0	---	---	---	2	---	---	No	100% Non-Detect
Thallium	7440-28-0	12	0	---	---	---	0.05	---	---	No	100% Non-Detect
Vanadium	7440-62-2	12	12	7.9	11.6	17.2	1.59	12	10.8	Yes	[Maximum] > ESV
Zinc	7440-66-6	12	12	16	36	65	6.62	12	9.9	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	12	7	0.11	0.41	0.84	0.098	7	8.6	Yes	[Maximum] > ESV
Fluoride	16984-48-8	12	12	1.14	3.68	9.59	120	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	12	12	2500	8153	17800	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	12	12	2570	6329	13800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	12	12	452	908	1200	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	12	11	51	368	844	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	2	0	---	---	---	0.00332	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	2	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	2	0	---	---	---	0.119	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	2	0	---	---	---	0.00398	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	2	0	---	---	---	0.119	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	2	0	---	---	---	0.224	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	2	0	---	---	---	0.005	---	---	No	100% Non-Detect
Dieldrin	60-57-1	2	0	---	---	---	0.00238	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	2	0	---	---	---	0.0358	---	---	No	100% Non-Detect
Endrin	72-20-8	2	0	---	---	---	0.0014	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	2	0	---	---	---	0.0105	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	2	0	---	---	---	0.005	---	---	No	100% Non-Detect
Heptachlor	76-44-8	2	0	---	---	---	0.00598	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	2	0	---	---	---	0.152	---	---	No	100% Non-Detect

Table B-18
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methoxychlor	72-43-5	2	0	---	---	---	0.0199	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	2	0	---	---	---	0.0063	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	2	0	---	---	---	0.021	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	2	0	---	---	---	0.0035	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	2	0	---	---	---	0.119	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	2	0	---	---	---	0.224	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	2	0	---	---	---	1.1	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	2	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	2	0	---	---	---	0.0073	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	2	0	---	---	---	0.041	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	2	0	---	---	---	0.88	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	2	0	---	---	---	0.000332	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	12	0	---	---	---	3.24	---	---	No	100% Non-Detect
Acenaphthene	83-32-9	12	0	---	---	---	0.25	---	---	No	100% Non-Detect
Acenaphthylene	208-96-8	12	0	---	---	---	120	---	---	No	100% Non-Detect
Anthracene	120-12-7	12	3	0.0098	0.0116	0.013	6.8	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	12	11	0.013	0.074	0.15	10	0	<1	No	[Maximum] < ESV
Fluorene	86-73-7	12	1	0.0062	0.0062	0.0062	3.7	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	12	0	---	---	---	0.0994	---	---	No	100% Non-Detect
Phenanthrene	85-01-8	12	11	0.0058	0.0412	0.085	5.5	0	<1	No	[Maximum] < ESV
Total LMW PAHs - 1/2MDL	---	12	11	0.02475	0.14272	0.241	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - MDL	---	12	11	0.0307	0.1666	0.29	29	0	<1	No	[Maximum] < ESV
Total LMW PAHs - Zero	---	12	11	0.0188	0.1188	0.2068	29	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	12	11	0.007	0.05	0.091	1.52	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	12	10	0.0061	0.0413	0.074	0.73	0	<1	No	[Maximum] < ESV
Benzo(B)Fluoranthene	205-99-2	12	11	0.015	0.079	0.16	18	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	12	11	0.0076	0.0518	0.1	25	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	12	10	0.0039	0.0337	0.057	71	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	12	11	0.016	0.074	0.2	3.1	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	12	7	0.0066	0.0126	0.021	14	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	12	11	0.0061	0.0413	0.093	71	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	12	11	0.011	0.065	0.12	10	0	<1	No	[Maximum] < ESV
Total HMW PAHs - 1/2MDL	---	12	11	0.07365	0.4428	0.8145	1.1	0	<1	No	[Maximum] < ESV
Total HMW PAHs - MDL	---	12	11	0.0746	0.4475	0.828	1.1	0	<1	No	[Maximum] < ESV
Total HMW PAHs - Zero	---	12	11	0.0727	0.4381	0.812	1.1	0	<1	No	[Maximum] < ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	12	0	---	---	---	2.02	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	12	0	---	---	---	2.05	---	---	No	100% Non-Detect

Table B-18
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,3,4,6-Tetrachlorophenol	58-90-2	12	0	---	---	---	0.199	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	12	0	---	---	---	4	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	12	0	---	---	---	9.94	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	12	0	---	---	---	87.5	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	12	0	---	---	---	0.01	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	12	0	---	---	---	0.0609	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	12	0	---	---	---	1.28	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	12	0	---	---	---	0.0328	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	12	0	---	---	---	0.0122	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	12	0	---	---	---	0.243	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	12	0	---	---	---	0.67	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	12	0	---	---	---	5.3	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	12	0	---	---	---	1.6	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	12	0	---	---	---	0.646	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	12	0	---	---	---	3.16	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	12	0	---	---	---	0.144	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	12	0	---	---	---	7.95	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	12	0	---	---	---	1	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	12	0	---	---	---	21.9	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	12	0	---	---	---	5.12	---	---	No	100% Non-Detect
Acetophenone	98-86-2	12	1	0.0093	0.0093	0.0093	300	0	<1	No	[Maximum] < ESV
Atrazine	1912-24-9	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	12	2	0.039	0.069	0.1	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	12	0	---	---	---	0.239	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	12	0	---	---	---	60	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	12	0	---	---	---	0.302	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	12	0	---	---	---	23.7	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	12	0	---	---	---	19.9	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	12	0	---	---	---	0.02	---	---	No	100% Non-Detect
Caprolactam	105-60-2	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	12	9	0.0023	0.0127	0.023	79	0	<1	No	[Maximum] < ESV
Dibenzofuran	132-64-9	12	0	---	---	---	6.1	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	12	0	---	---	---	24.8	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	12	0	---	---	---	10	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	12	0	---	---	---	0.011	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	12	0	---	---	---	0.91	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	12	0	---	---	---	0.079	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	12	0	---	---	---	0.0398	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	12	0	---	---	---	0.755	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	12	0	---	---	---	0.596	---	---	No	100% Non-Detect

Table B-18
Screening-Level Ecological Exposure Estimate for Bulk Soil (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Isophorone	78-59-1	12	1	0.015	0.015	0.015	139	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	12	0	---	---	---	1.31	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	12	0	---	---	---	0.544	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	12	0	---	---	---	0.545	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	12	0	---	---	---	0.119	---	---	No	100% Non-Detect
Phenol	108-95-2	12	1	0.13	0.13	0.13	0.79	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
Moisture, Percent	---	6	6	31	92	170	NESV	---	---	---	---
Total Organic Carbon	7440440	12	12	5810	57795	162000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-19
Screening-Level Ecological Exposure Estimate for Surface Water
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (ug/L)												
Aluminum	7429-90-5	U	16	15	16.1	517.8	5750	87	6	66.1	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	11	0	---	---	---	87	---	---	No	100% Non-Detect
Antimony	7440-36-0	U	16	3	2.4	2.7	2.9	30	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	F	11	0	---	---	---	30	---	---	No	100% Non-Detect
Arsenic	7440-38-2	U	16	10	0.78	1.25	3.7	5	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	F	11	4	0.79	1.02	1.5	3.1	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	U	16	16	77.9	124.9	245	4	16	61.3	Yes	[Maximum] > ESV
Barium	7440-39-3	F	11	11	83.5	121.3	229	4	11	57.3	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	16	0	---	---	---	0.66	---	---	No	100% Non-Detect
Beryllium	7440-41-7	F	11	0	---	---	---	0.66	---	---	No	100% Non-Detect
Cadmium	7440-43-9	U	16	0	---	---	---	0.241	---	---	No	100% Non-Detect
Cadmium	7440-43-9	F	11	0	---	---	---	0.243	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	U	16	1	3.4	3.4	3.4	8.9	0	<1	No	[Maximum] < ESV
Chromium, Total	7440-47-3	F	11	0	---	---	---	8.9	---	---	No	100% Non-Detect
Cobalt	7440-48-4	U	16	1	2	2	2	5.1	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	F	11	0	---	---	---	5.1	---	---	No	100% Non-Detect
Copper	7440-50-8	U	16	2	2.6	4.2	5.7	0.23	2	24.8	Yes	[Maximum] > ESV
Copper	7440-50-8	F	11	0	---	---	---	0.23	---	---	No	100% Non-Detect
Iron	7439-89-6	U	16	8	50.2	703.9	4760	300	2	15.9	Yes	[Maximum] > ESV
Iron	7439-89-6	F	11	0	---	---	---	158	---	---	No	100% Non-Detect
Lead	7439-92-1	U	16	2	0.66	2.58	4.5	6.065	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	F	11	0	---	---	---	4.366	---	---	No	100% Non-Detect
Manganese	7439-96-5	U	16	13	3	26	127	120	1	1.1	Yes	[Maximum] > ESV
Manganese	7439-96-5	F	11	8	3.4	19.1	80.5	120	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	U	16	0	---	---	---	0.026	---	---	No	100% Non-Detect
Mercury	7439-97-6	F	11	0	---	---	---	0.026	---	---	No	100% Non-Detect
Nickel	7440-02-0	U	16	2	2.1	3	3.9	80.089	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	F	11	0	---	---	---	5	---	---	No	100% Non-Detect
Selenium	7782-49-2	U	16	1	1.5	1.5	1.5	1	1	1.5	Yes	[Maximum] > ESV
Selenium	7782-49-2	F	11	1	1.4	1.4	1.4	3.1	0	<1	No	[Maximum] < ESV
Silver	7440-22-4	U	16	0	---	---	---	0.25	---	---	No	100% Non-Detect
Silver	7440-22-4	F	11	0	---	---	---	0.12	---	---	No	100% Non-Detect
Thallium	7440-28-0	U	16	0	---	---	---	0.8	---	---	No	100% Non-Detect
Thallium	7440-28-0	F	11	0	---	---	---	12	---	---	No	100% Non-Detect
Vanadium	7440-62-2	U	16	3	2.1	2.7	3.9	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	F	11	0	---	---	---	20	---	---	No	100% Non-Detect
Zinc	7440-66-6	U	16	2	9.1	14.1	19.2	184.083	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	F	11	0	---	---	---	7	---	---	No	100% Non-Detect
Other Inorganic Parameters (ug/L unless otherwise noted)												
Chloride (As Cl)	16887-00-6	U	16	16	1200	1796	3970	120000	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	U	16	1	4.4	4.4	4.4	5.2	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	F	1	0	---	---	---	5.2	---	---	No	100% Non-Detect
Cyanide (Free)	FREE CN	U	10	6	1.8	2.8	4.1	5	0	<1	No	[Maximum] < ESV
Fluoride	16984-48-8	U	16	16	166	215	301	120	16	2.5	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	1	1	188	188	188	120	1	1.6	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	16	7	28.4	89.8	167	1001.333	0	<1	No	[Maximum] < ESV
Essential Nutrients (ug/L)												
Calcium	7440-70-2	U	16	16	42600	55506	82100	116000	0	<1	No	Essential Nutrient

Table B-19
Screening-Level Ecological Exposure Estimate for Surface Water
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Calcium	7440-70-2	F	11	11	46700	55073	75400	116000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	U	16	16	10300	13288	19500	82000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	F	11	11	10500	12509	16500	82000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	U	16	16	432	615	1250	53000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	F	11	11	397	532	969	53000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	U	16	16	4490	19279	108000	680000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	F	11	11	6400	18653	89200	680000	0	<1	No	Essential Nutrient
Physicochemical Parameters												
Alkalinity, Total (As CaCO3)	---	U	16	16	144000	196063	286000	NESV	---	---	---	---
Dissolved Organic Carbon	---	F	11	11	1460	2296	5260	NESV	---	---	---	---
Dissolved Oxygen	---	U	16	16	1940	8711	13080	NESV	---	---	---	---
Hardness (As CaCO3)	---	U	16	16	166000	199313	304000	NESV	---	---	---	---
Oxidation-Reduction Potential (mv)	---	U	16	16	45	149	292	NESV	---	---	---	---
pH (s.u.)	---	U	15	15	5.93	7.1	8.37	NESV	---	---	---	---
Specific Conductance (ms/cm)	---	U	16	16	0.323	0.412	0.756	NESV	---	---	---	---
Temperature (°C)	---	U	16	16	3.19	10.91	16.65	NESV	---	---	---	---
Total Organic Carbon	---	U	10	10	1300	2080	3900	NESV	---	---	---	---
Total Dissolved Solids	---	U	16	16	168000	256125	560000	NESV	---	---	---	---
Total Suspended Solids	---	U	16	10	1600	39450	262000	NESV	---	---	---	---
Turbidity (NTU)	---	U	15	15	0	4	28	NESV	---	---	---	---
Other Nutrients (ug/L)												
Nitrogen, Nitrite + Nitrate	NO3NO2N	U	16	3	137	349	526	NESV	---	---	No	Other Nutrient
Phosphorus, Total Orthophosphate (As P)	---	U	13	2	138	139	140	NESV	---	---	No	Other Nutrient
Sulfate (As SO4)	14808-79-8	U	16	16	5660	31882	172000	NESV	---	---	No	Other Nutrient
Sulfide	18496-25-8	U	11	0	---	---	---	NESV	---	---	No	Other Nutrient

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
F: Filtered

Table B-20
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	12	12	12100	20617	35400	26000	3	1.4	Yes	[Maximum] > ESV
Antimony	7440-36-0	12	0	---	---	---	2	---	---	No	100% Non-Detect
Arsenic	7440-38-2	12	12	3.2	7.4	14.5	9.79	3	1.5	Yes	[Maximum] > ESV
Barium	7440-39-3	12	12	136	448	905	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	12	10	0.32	0.67	1.1	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	12	0	---	---	---	0.583	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	12	12	5	10	20	36.2	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	12	12	1.9	4.8	6.6	50	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	12	12	10.1	20.4	42.5	28	3	1.5	Yes	[Maximum] > ESV
Iron	7439-89-6	12	12	7770	14242	25200	20000	2	1.3	Yes	[Maximum] > ESV
Lead	7439-92-1	12	12	6.1	11.6	17.6	35.8	0	<1	No	[Maximum] < ESV
Manganese	7439-96-5	12	12	34.1	317.6	988	460	3	2.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	12	6	0.012	0.03	0.062	0.174	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	12	12	6	11	15	19.5	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	12	4	0.57	2.07	4.4	2	2	2.2	Yes	[Maximum] > ESV
Silver	7440-22-4	12	0	---	---	---	0.5	---	---	No	100% Non-Detect
Thallium	7440-28-0	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vanadium	7440-62-2	12	12	7.9	11.6	17.2	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	12	12	16	36	65	98	0	<1	No	[Maximum] < ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	12	7	0.11	0.41	0.84	0.0001	7	8400	Yes	[Maximum] > ESV
Fluoride	16984-48-8	12	12	1.14	3.68	9.59	290.2	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	12	12	2500	8153	17800	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	12	12	2570	6329	13800	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	12	12	452	908	1200	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	12	11	51	368	844	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	2	0	---	---	---	0.002	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	2	0	---	---	---	0.006	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	2	0	---	---	---	0.000006	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	2	0	---	---	---	0.005	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	2	0	---	---	---	0.000006	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	2	0	---	---	---	0.1388	---	---	No	100% Non-Detect
Dieldrin	60-57-1	2	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	2	0	---	---	---	0.000006	---	---	No	100% Non-Detect
Endrin	72-20-8	2	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	2	0	---	---	---	0.004428	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	2	0	---	---	---	0.00237	---	---	No	100% Non-Detect
Heptachlor	76-44-8	2	0	---	---	---	0.0006	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	2	0	---	---	---	0.00247	---	---	No	100% Non-Detect

Table B-20
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methoxychlor	72-43-5	2	0	---	---	---	0.0136	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	2	0	---	---	---	0.00488	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	2	0	---	---	---	0.00316	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	2	0	---	---	---	0.00416	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	2	0	---	---	---	0.000077	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	2	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	2	0	---	---	---	0.032	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	12	0	---	---	---	0.0202	---	---	No	100% Non-Detect
Acenaphthene	83-32-9	12	0	---	---	---	0.0067	---	---	No	100% Non-Detect
Acenaphthylene	208-96-8	12	0	---	---	---	0.0059	---	---	No	100% Non-Detect
Anthracene	120-12-7	12	3	0.0098	0.0116	0.013	0.01	2	1.3	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	12	11	0.013	0.074	0.15	0.031	9	4.8	Yes	[Maximum] > ESV
Fluorene	86-73-7	12	1	0.0062	0.0062	0.0062	0.01	0	<1	No	[Maximum] < ESV
Naphthalene	91-20-3	12	0	---	---	---	0.015	---	---	No	100% Non-Detect
Phenanthrene	85-01-8	12	11	0.0058	0.0412	0.085	0.019	8	4.5	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	12	11	0.007	0.05	0.091	0.032	7	2.8	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	12	10	0.0061	0.0413	0.074	0.016	9	4.6	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	12	11	0.015	0.079	0.16	9.79	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	12	11	0.0076	0.0518	0.1	0.016	10	6.3	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	12	10	0.0039	0.0337	0.057	0.24	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	12	11	0.016	0.074	0.2	0.027	9	7.4	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	12	7	0.0066	0.0126	0.021	0.01	4	2.1	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	12	11	0.0061	0.0413	0.093	0.017	10	5.5	Yes	[Maximum] > ESV
Pyrene	129-00-0	12	11	0.011	0.065	0.12	0.044	7	2.7	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	12	11	0.0824	0.5024	0.8925	0.26	8	3.4	Yes	[Maximum] > ESV
Total PAHs - MDL	---	12	11	0.0883	0.5273	0.956	0.26	9	3.7	Yes	[Maximum] > ESV
Total PAHs - Zero	---	12	11	0.0765	0.4775	0.8588	0.26	8	3.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	12	0	---	---	---	0.129	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	12	0	---	---	---	0.288	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	12	0	---	---	---	0.208	---	---	No	100% Non-Detect

Table B-20
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,4-Dichlorophenol	120-83-2	12	0	---	---	---	0.0817	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	12	0	---	---	---	0.029	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	12	0	---	---	---	0.00621	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	12	0	---	---	---	0.0144	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	12	0	---	---	---	0.0398	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	12	0	---	---	---	0.417	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	12	0	---	---	---	0.02716	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	12	0	---	---	---	0.011856	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	2	0	---	---	---	0.0202	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	12	0	---	---	---	0.127	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	12	0	---	---	---	0.104	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	12	0	---	---	---	0.255	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	12	0	---	---	---	0.388	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	12	0	---	---	---	0.146	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	12	0	---	---	---	0.013	---	---	No	100% Non-Detect
Acetophenone	98-86-2	12	1	0.0093	0.0093	0.0093	NESV	---	---	Yes	No ESV Available
Atrazine	1912-24-9	12	0	---	---	---	0.00662	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	12	2	0.039	0.069	0.1	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	12	0	---	---	---	1.97	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	12	0	---	---	---	1.22	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	12	0	---	---	---	3.52	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	12	0	---	---	---	0.18	---	---	No	100% Non-Detect
Caprolactam	105-60-2	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	12	9	0.0023	0.0127	0.023	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	12	0	---	---	---	0.300736	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	12	0	---	---	---	0.295	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	12	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	12	0	---	---	---	1.1989	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	12	0	---	---	---	16.8858	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	12	0	---	---	---	0.02	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	12	0	---	---	---	0.0265	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	12	0	---	---	---	0.901	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	12	0	---	---	---	0.2136	---	---	No	100% Non-Detect
Isophorone	78-59-1	12	1	0.015	0.015	0.015	0.432	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	12	0	---	---	---	0.145	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	12	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-20
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
N-Nitrosodiphenylamine	86-30-6	12	0	---	---	---	0.516	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	12	0	---	---	---	0.504	---	---	No	100% Non-Detect
Phenol	108-95-2	12	1	0.13	0.13	0.13	0.001152	1	112.8	Yes	[Maximum] > ESV
Physicochemical Parameters											
Moisture, Percent	---	6	6	31	92	170	NESV	---	---	---	---
Total Organic Carbon	7440440	12	12	5810	57795	162000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-21
Screening-Level Ecological Exposure Estimate for Surface Water
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (ug/L)												
Aluminum	7429-90-5	U	76	70	17.5	333.4	1540	87	44	17.7	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	49	12	17.1	33.4	75.3	87	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	U	76	4	0.64	0.64	0.66	30	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	F	49	0	---	---	---	30	---	---	No	100% Non-Detect
Arsenic	7440-38-2	U	76	5	0.66	0.82	0.95	5	0	<1	No	[Maximum] < ESV
Arsenic	7440-38-2	F	49	0	---	---	---	3.1	---	---	No	100% Non-Detect
Barium	7440-39-3	U	76	76	62.8	110.1	216	4	76	54	Yes	[Maximum] > ESV
Barium	7440-39-3	F	49	49	62.5	95.3	191	4	49	47.8	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	76	0	---	---	---	0.66	---	---	No	100% Non-Detect
Beryllium	7440-41-7	F	49	0	---	---	---	0.66	---	---	No	100% Non-Detect
Cadmium	7440-43-9	U	76	0	---	---	---	0.1	---	---	No	100% Non-Detect
Cadmium	7440-43-9	F	49	0	---	---	---	0.1	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	U	76	6	1.3	1.6	2	8.9	0	<1	No	[Maximum] < ESV
Chromium, Total	7440-47-3	F	49	0	---	---	---	8.9	---	---	No	100% Non-Detect
Cobalt	7440-48-4	U	76	4	1.3	1.4	1.7	5.1	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	F	49	0	---	---	---	5.1	---	---	No	100% Non-Detect
Copper	7440-50-8	U	76	21	1.4	4.2	12.3	0.23	21	53.5	Yes	[Maximum] > ESV
Copper	7440-50-8	F	49	2	3	15	26	0.23	2	114.8	Yes	[Maximum] > ESV
Iron	7439-89-6	U	76	51	62.4	551.7	1640	300	34	5.5	Yes	[Maximum] > ESV
Iron	7439-89-6	F	49	11	45.8	98.6	164	158	1	1	Yes	[Maximum] > ESV
Lead	7439-92-1	U	76	22	0.38	0.81	2.9	1.576	0	1.8	No	[Maximum] < ESV
Lead	7439-92-1	F	49	0	---	---	---	1.371	---	---	No	100% Non-Detect
Manganese	7439-96-5	U	76	54	2.6	29.3	212	120	1	1.8	Yes	[Maximum] > ESV
Manganese	7439-96-5	F	49	29	2.5	16.4	63.7	120	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	U	76	0	---	---	---	0.026	---	---	No	100% Non-Detect
Mercury	7439-97-6	F	49	0	---	---	---	0.026	---	---	No	100% Non-Detect
Nickel	7440-02-0	U	76	4	1.4	1.7	2.2	32.71	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	F	49	2	1.3	16.8	32.2	5	1	6.4	Yes	[Maximum] > ESV
Selenium	7782-49-2	U	76	0	---	---	---	1	---	---	No	100% Non-Detect
Selenium	7782-49-2	F	49	0	---	---	---	3.1	---	---	No	100% Non-Detect
Silver	7440-22-4	U	76	0	---	---	---	0.25	---	---	No	100% Non-Detect
Silver	7440-22-4	F	49	0	---	---	---	0.12	---	---	No	100% Non-Detect
Thallium	7440-28-0	U	76	0	---	---	---	0.8	---	---	No	100% Non-Detect
Thallium	7440-28-0	F	49	0	---	---	---	12	---	---	No	100% Non-Detect
Vanadium	7440-62-2	U	76	4	1.2	1.4	1.9	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	F	49	0	---	---	---	20	---	---	No	100% Non-Detect
Zinc	7440-66-6	U	76	8	6.1	11.6	19.9	75.08	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	F	49	3	5.8	6.2	6.8	7	0	<1	No	[Maximum] < ESV
Other Inorganic Parameters (ug/L unless otherwise noted)												
Chloride (As Cl)	16887-00-6	U	76	76	227	781	3750	120000	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	U	76	28	3.2	107.8	378	5.2	27	72.7	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	15	9	11.7	108.7	328	5.2	9	63.1	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	U	48	26	1.5	19.3	139	5	14	27.8	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	F	10	10	1.6	10.3	42.2	5	7	8.4	Yes	[Maximum] > ESV
Fluoride	16984-48-8	U	76	65	28.6	450.8	2570	120	35	21.4	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	9	9	109	179	558	120	3	4.7	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	76	18	48	83	143	1241.155	0	<1	No	[Maximum] < ESV
Essential Nutrients (ug/L)												

Table B-21
Screening-Level Ecological Exposure Estimate for Surface Water
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Calcium	7440-70-2	U	76	76	17600	28266	62600	116000	0	<1	No	Essential Nutrient
Calcium	7440-70-2	F	49	49	17300	26282	61900	116000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	U	76	76	4670	7876	18200	82000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	F	49	49	4170	6737	17300	82000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	U	76	76	242	495	1200	53000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	F	49	49	237	392	1040	53000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	U	76	76	666	5966	40700	680000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	F	49	49	554	9132	169000	680000	0	<1	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (ug/L)												
2-Methylnaphthalene	91-57-6	U	11	0	---	---	---	4.7	---	---	No	100% Non-Detect
Acenaphthene	83-32-9	U	11	0	---	---	---	5.8	---	---	No	100% Non-Detect
Acenaphthylene	208-96-8	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Anthracene	120-12-7	U	11	1	0.0074	0.0074	0.0074	0.012	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	U	11	3	0.0048	0.2353	0.63	0.018	2	35	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	U	11	2	0.041	0.145	0.25	0.014	2	17.9	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	U	11	3	0.0056	0.2685	0.7	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	U	11	1	0.044	0.044	0.044	NESV	---	---	Yes	No ESV Available
Benzo(K)Fluoranthene	207-08-9	U	11	2	0.095	0.277	0.46	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	U	11	4	0.011	0.351	1.2	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	U	11	1	0.015	0.015	0.015	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	U	11	4	0.0077	0.5872	2.1	0.04	3	52.5	Yes	[Maximum] > ESV
Fluorene	86-73-7	U	11	0	---	---	---	3	---	---	No	100% Non-Detect
Indeno(1,2,3-C,D)Pyrene	913-39-5	U	11	1	0.04	0.04	0.04	NESV	---	---	Yes	No ESV Available
Naphthalene	91-20-3	U	11	1	0.004	0.004	0.004	1.1	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	U	11	2	0.024	0.612	1.2	0.4	1	3	Yes	[Maximum] > ESV
Pyrene	129-00-0	U	11	4	0.0069	0.453	1.6	0.025	2	64	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (ug/L)												
1,2,4,5-Tetrachlorobenzene	95-94-3	U	11	0	---	---	---	3	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	U	11	0	---	---	---	1	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	U	11	0	---	---	---	4.9	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	U	11	0	---	---	---	11	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	U	11	0	---	---	---	44	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	U	11	0	---	---	---	81	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	U	11	0	---	---	---	24	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	U	11	0	---	---	---	13	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	U	11	0	---	---	---	300	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	MEPH3MEPH4	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	U	11	0	---	---	---	4.5	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	U	11	0	---	---	---	1.5	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-21
Screening-Level Ecological Exposure Estimate for Surface Water
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
4-Chloroaniline	106-47-8	U	11	0	---	---	---	232	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	U	11	0	---	---	---	60	---	---	No	100% Non-Detect
Acetophenone	98-86-2	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Atrazine	1912-24-9	U	11	0	---	---	---	1.8	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Benzyl Butyl Phthalate	85-68-7	U	11	3	0.56	0.72	0.86	19	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	U	11	0	---	---	---	14	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	U	11	4	1.2	9.1	22	3	3	7.3	Yes	[Maximum] > ESV
Caprolactam	105-60-2	U	11	4	0.6	0.9	1.1	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibenzofuran	132-64-9	U	11	0	---	---	---	3.7	---	---	No	100% Non-Detect
Diethyl Phthalate	84-66-2	U	11	0	---	---	---	210	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	U	11	0	---	---	---	19	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	U	11	0	---	---	---	22	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	U	11	0	---	---	---	0.0003	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	U	11	0	---	---	---	1.3	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	U	11	0	---	---	---	12	---	---	No	100% Non-Detect
Isophorone	78-59-1	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	U	11	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	U	11	0	---	---	---	210	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	U	11	0	---	---	---	0.5	---	---	No	100% Non-Detect
Phenol	108-95-2	U	11	0	---	---	---	4	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (ug/L)												
1,1,1-Trichloroethane	71-55-6	U	6	0	---	---	---	11	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	U	6	0	---	---	---	610	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	U	6	0	---	---	---	1200	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	U	6	0	---	---	---	47	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	U	6	0	---	---	---	25	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	U	6	0	---	---	---	8	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	U	6	0	---	---	---	24	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	U	6	0	---	---	---	0.7	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	U	6	0	---	---	---	100	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	U	6	0	---	---	---	71	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	U	6	0	---	---	---	15	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	U	6	0	---	---	---	99	---	---	No	100% Non-Detect

Table B-21
Screening-Level Ecological Exposure Estimate for Surface Water
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Acetone	67-64-1	U	6	0	---	---	---	1500	---	---	No	100% Non-Detect
Benzene	71-43-2	U	6	0	---	---	---	130	---	---	No	100% Non-Detect
Bromochloromethane	74-97-5	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromoform	75-25-2	U	6	0	---	---	---	320	---	---	No	100% Non-Detect
Bromomethane	74-83-9	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	U	6	0	---	---	---	0.92	---	---	No	100% Non-Detect
Carbon Tetrachloride	56-23-5	U	6	0	---	---	---	9.8	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	U	6	0	---	---	---	1.3	---	---	No	100% Non-Detect
Chloroethane	75-00-3	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	U	6	0	---	---	---	1.8	---	---	No	100% Non-Detect
Chloromethane	74-87-3	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	U	6	0	---	---	---	590	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	U	6	0	---	---	---	0.055	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dibromochloromethane	124-48-1	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	U	6	0	---	---	---	7.3	---	---	No	100% Non-Detect
Isopropylbenzene (Cumene)	98-82-8	U	6	0	---	---	---	2.6	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methyl Ethyl Ketone (2-Butanone)	78-93-3	U	6	0	---	---	---	14000	---	---	No	100% Non-Detect
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	U	6	0	---	---	---	170	---	---	No	100% Non-Detect
Methylcyclohexane	108-87-2	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Methylene Chloride	75-09-2	U	6	0	---	---	---	98.1	---	---	No	100% Non-Detect
Styrene	100-42-5	U	6	0	---	---	---	72	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	U	6	0	---	---	---	10000	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	U	6	0	---	---	---	98	---	---	No	100% Non-Detect
Toluene	108-88-3	U	6	0	---	---	---	2	---	---	No	100% Non-Detect
Trans-1,2-Dichloroethene	156-60-5	U	6	0	---	---	---	590	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	U	6	0	---	---	---	0.055	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	U	6	0	---	---	---	21	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	U	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	U	6	0	---	---	---	930	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	U	6	0	---	---	---	1.8	---	---	No	100% Non-Detect
O-Xylene (1,2-Dimethylbenzene)	95-47-6	U	6	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - 1/2MDL	1330-20-7	U	6	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - MDL	1330-20-7	U	6	0	---	---	---	13	---	---	No	100% Non-Detect
Total Xylene - Zero	1330-20-7	U	6	0	---	---	---	13	---	---	No	100% Non-Detect
Physicochemical Parameters												
Alkalinity, Total (As CaCO3)	---	U	76	76	69000	106209	278000	NESV	---	---	---	---
Dissolved Organic Carbon	---	F	43	43	956	1322	2450	NESV	---	---	---	---
Dissolved Oxygen	---	U	76	76	1780	11667	24720	NESV	---	---	---	---
Hardness (As CaCO3)	---	U	76	76	57600	104068	252000	NESV	---	---	---	---
Oxidation-Reduction Potential (mv)	---	U	76	76	-25	182	320	NESV	---	---	---	---
pH (s.u.)	---	U	70	70	5.48	7.26	8.24	NESV	---	---	---	---
Specific Conductance (ms/cm)	---	U	76	76	0.127	0.289	5.85	NESV	---	---	---	---
Temperature (°C)	---	U	76	76	2.22	7.83	12.86	NESV	---	---	---	---

Table B-21
Screening-Level Ecological Exposure Estimate for Surface Water
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Total Organic Carbon	---	U	34	34	960	1214	1500	NESV	---	---	---	---
Total Dissolved Solids	---	U	70	70	33000	112986	343000	NESV	---	---	---	---
Total Suspended Solids	---	U	70	61	1500	26921	413000	NESV	---	---	---	---
Turbidity (NTU)	---	U	73	73	0	21	281	NESV	---	---	---	---
Other Nutrients (ug/L)												
Nitrogen, Nitrite + Nitrate	NO3NO2N	U	76	56	100	503	2860	NESV	---	---	No	Other Nutrient
Phosphorus, Total Orthophosphate (As P)	---	U	76	2	144	153	162	NESV	---	---	No	Other Nutrient
Sulfate (As SO4)	14808-79-8	U	76	76	2430	5893	23800	NESV	---	---	No	Other Nutrient
Sulfide	18496-25-8	U	43	0	---	---	---	NESV	---	---	No	Other Nutrient

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
TCL: Target Compound List
U: Unfiltered
F: Filtered

Table B-22
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	32	32	5750	7803	12000	26000	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	32	0	---	---	---	2	---	---	No	100% Non-Detect
Arsenic	7440-38-2	32	32	2.7	3.8	6.2	9.79	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	32	32	38	89	151	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	32	31	0.22	0.39	0.57	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	32	0	---	---	---	0.583	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	32	32	6.5	8.8	10.5	36.2	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	32	32	4.1	5.2	6.4	50	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	32	32	6.9	11.1	17.1	28	0	<1	No	[Maximum] < ESV
Iron	7439-89-6	32	32	10000	13056	15600	20000	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	32	32	4.3	6.8	11.7	35.8	0	<1	No	[Maximum] < ESV
Manganese	7439-96-5	32	32	129	201	297	460	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	32	11	0.013	0.024	0.042	0.174	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	32	32	8.4	11	18.5	19.5	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	32	0	---	---	---	2	---	---	No	100% Non-Detect
Silver	7440-22-4	32	0	---	---	---	0.5	---	---	No	100% Non-Detect
Thallium	7440-28-0	32	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vanadium	7440-62-2	32	32	7.5	14.3	25.5	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	32	32	28.7	38.3	58.4	98	0	<1	No	[Maximum] < ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	32	17	0.067	1.601	8.3	0.0001	17	83000	Yes	[Maximum] > ESV
Cyanide (Free)	STL00131	4	0	---	---	---	NESV	---	---	No	100% Non-Detect
Fluoride	16984-48-8	32	22	0.36	11.59	69.2	290.2	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	32	32	7390	15866	31400	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	32	32	7010	9819	12100	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	32	32	279	669	1160	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	32	15	39.9	94.6	198	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	9	0	---	---	---	0.002	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	9	0	---	---	---	0.006	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	9	0	---	---	---	0.005	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	9	0	---	---	---	0.138810616	---	---	No	100% Non-Detect
Dieldrin	60-57-1	9	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	9	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Endrin	72-20-8	9	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	9	0	---	---	---	0.004428	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	9	0	---	---	---	0.00237	---	---	No	100% Non-Detect
Heptachlor	76-44-8	9	0	---	---	---	0.0006	---	---	No	100% Non-Detect

Table B-22
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Heptachlor Epoxide	1024-57-3	9	0	---	---	---	0.00247	---	---	No	100% Non-Detect
Methoxychlor	72-43-5	9	0	---	---	---	0.0136	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	9	0	---	---	---	0.00488	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	9	0	---	---	---	0.00316	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	9	0	---	---	---	0.00416	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	9	0	---	---	---	0.000077	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	9	0	---	---	---	0.032	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	32	0	---	---	---	0.0202	---	---	No	100% Non-Detect
Acenaphthene	83-32-9	32	5	0.0011	0.0123	0.033	0.00671	2	4.9	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	32	0	---	---	---	0.00587	---	---	No	100% Non-Detect
Anthracene	120-12-7	32	9	0.0012	0.0474	0.16	0.01	5	16	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	32	22	0.0011	0.7677	6.5	0.031	14	209.7	Yes	[Maximum] > ESV
Fluorene	86-73-7	32	1	0.03	0.03	0.03	0.01	1	3	Yes	[Maximum] > ESV
Naphthalene	91-20-3	32	2	0.016	0.018	0.019	0.015	2	1.3	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	32	21	0.0019	0.121	1	0.019	13	52.6	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	32	14	0.0014	0.1718	0.87	0.032	10	27.2	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	32	17	0.00095	0.3119	2.1	0.016	11	131.3	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	32	21	0.0012	0.5333	4.1	9.79	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	32	18	0.00098	0.18175	1.2	0.016	12	75	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	32	17	0.0015	0.312	1.9	0.24	5	7.9	Yes	[Maximum] > ESV
Chrysene	218-01-9	32	22	0.0013	0.7077	4.9	0.027	14	181.5	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	32	9	0.0013	0.1098	0.41	0.01	8	41	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	32	17	0.00098	0.2136	1.5	0.017	12	88.2	Yes	[Maximum] > ESV
Pyrene	129-00-0	32	21	0.0014	0.7137	6.8	0.044	14	154.5	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	32	22	0.01133	3.28688	26.829	0.26	14	103.2	Yes	[Maximum] > ESV
Total PAHs - MDL	---	32	22	0.01628	3.32628	26.836	0.26	14	103.2	Yes	[Maximum] > ESV
Total PAHs - Zero	---	32	22	0.00638	3.24747	26.822	0.26	14	103.2	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	27	0	---	---	---	0.129	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	27	0	---	---	---	0.288	---	---	No	100% Non-Detect

Table B-22
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,4,6-Trichlorophenol	88-06-2	27	0	---	---	---	0.208	---	---	No	100% Non-Detect
2,4-Dichlorophenol	120-83-2	27	0	---	---	---	0.0817	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	27	0	---	---	---	0.029	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	27	0	---	---	---	0.00621	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	27	0	---	---	---	0.0144	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	27	0	---	---	---	0.0398	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	27	0	---	---	---	0.417	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	27	0	---	---	---	0.02716	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	27	0	---	---	---	0.011856	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	15	4	0.024	0.192	0.49	0.0202	4	24.3	Yes	[Maximum] > ESV
3,3'-Dichlorobenzidine	91-94-1	27	0	---	---	---	0.127	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	27	0	---	---	---	0.104	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	27	0	---	---	---	0.255	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	27	0	---	---	---	0.388	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	27	0	---	---	---	0.146	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	27	0	---	---	---	0.013	---	---	No	100% Non-Detect
Acetophenone	98-86-2	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Atrazine	1912-24-9	27	0	---	---	---	0.00662	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	27	2	0.0098	0.0474	0.085	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	27	1	0.044	0.044	0.044	1.97	0	<1	No	[Maximum] < ESV
Biphenyl (Diphenyl)	92-52-4	27	0	---	---	---	1.22	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	27	0	---	---	---	3.52	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	27	3	0.018	0.103	0.26	0.18	1	1.4	Yes	[Maximum] > ESV
Caprolactam	105-60-2	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	27	6	0.0028	0.1198	0.36	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	27	2	0.00082	0.01091	0.021	0.300736	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	27	0	---	---	---	0.295	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	27	0	---	---	---	1.1989	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	27	1	0.084	0.084	0.084	16.8858	0	<1	No	[Maximum] < ESV
Hexachlorobenzene	118-74-1	27	0	---	---	---	0.02	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	27	0	---	---	---	0.0265	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	27	0	---	---	---	0.901	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	27	0	---	---	---	0.2136	---	---	No	100% Non-Detect
Isophorone	78-59-1	27	0	---	---	---	0.432	---	---	No	100% Non-Detect
Nitrobenzene	98-95-3	27	0	---	---	---	0.145	---	---	No	100% Non-Detect

Table B-22
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
N-Nitrosodi-N-Propylamine	621-64-7	27	0	---	---	---	NESV	---	---	No	100% Non-Detect
N-Nitrosodiphenylamine	86-30-6	27	0	---	---	---	0.516	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	27	0	---	---	---	0.504	---	---	No	100% Non-Detect
Phenol	108-95-2	27	0	---	---	---	0.001152	---	---	No	100% Non-Detect
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)											
1,1,1-Trichloroethane	71-55-6	6	0	---	---	---	0.0302	---	---	No	100% Non-Detect
1,1,2,2-Tetrachloroethane	79-34-5	6	0	---	---	---	0.85	---	---	No	100% Non-Detect
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,1,2-Trichloroethane	79-00-5	6	0	---	---	---	0.518	---	---	No	100% Non-Detect
1,1-Dichloroethane	75-34-3	6	0	---	---	---	0.000575	---	---	No	100% Non-Detect
1,1-Dichloroethene	75-35-4	6	0	---	---	---	0.0194	---	---	No	100% Non-Detect
1,2,3-Trichlorobenzene	87-61-6	6	0	---	---	---	0.858	---	---	No	100% Non-Detect
1,2,4-Trichlorobenzene	120-82-1	6	0	---	---	---	2.1	---	---	No	100% Non-Detect
1,2-Dibromo-3-Chloropropane	96-12-8	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,2-Dichlorobenzene	95-50-1	6	0	---	---	---	0.0165	---	---	No	100% Non-Detect
1,2-Dichloroethane	107-06-2	6	0	---	---	---	0.26	---	---	No	100% Non-Detect
1,2-Dichloropropane	78-87-5	6	0	---	---	---	0.333	---	---	No	100% Non-Detect
1,3-Dichlorobenzene	541-73-1	6	0	---	---	---	1.315	---	---	No	100% Non-Detect
1,4-Dichlorobenzene	106-46-7	6	0	---	---	---	0.318	---	---	No	100% Non-Detect
2-Hexanone	591-78-6	6	0	---	---	---	0.0582	---	---	No	100% Non-Detect
Acetone	67-64-1	6	6	0.018	0.045	0.089	0.0099	6	9	Yes	[Maximum] > ESV
Benzene	71-43-2	6	6	0.00085	0.00186	0.0035	0.14157	0	<1	No	[Maximum] < ESV
Bromochloromethane	74-97-5	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromodichloromethane	75-27-4	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bromoform	75-25-2	6	0	---	---	---	0.492	---	---	No	100% Non-Detect
Bromomethane	74-83-9	6	0	---	---	---	0.00137	---	---	No	100% Non-Detect
Carbon Disulfide	75-15-0	6	6	0.00045	0.00417	0.014	0.000851	5	16.5	Yes	[Maximum] > ESV
Carbon Tetrachloride	56-23-5	6	0	---	---	---	0.0642	---	---	No	100% Non-Detect
Chlorobenzene	108-90-7	6	0	---	---	---	0.00842	---	---	No	100% Non-Detect
Chloroethane	75-00-3	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Chloroform	67-66-3	6	0	---	---	---	0.121	---	---	No	100% Non-Detect
Chloromethane	74-87-3	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cis-1,2-Dichloroethylene	156-59-2	6	0	---	---	---	0.26	---	---	No	100% Non-Detect
Cis-1,3-Dichloropropene	10061-01-5	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Cyclohexane	110-82-7	6	6	0.0013	0.0025	0.0039	NESV	---	---	Yes	No ESV Available
Dibromochloromethane	124-48-1	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Dichlorodifluoromethane	75-71-8	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Ethylbenzene	100-41-4	6	6	0.00038	0.00071	0.0016	0.175	0	<1	No	[Maximum] < ESV
Isopropylbenzene (Cumene)	98-82-8	6	0	---	---	---	0.086	---	---	No	100% Non-Detect
Methyl Acetate	79-20-9	6	1	0.11	0.11	0.11	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	6	6	0.0025	0.0066	0.013	0.0424	0	<1	No	[Maximum] < ESV
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	6	0	---	---	---	0.0251	---	---	No	100% Non-Detect

Table B-22
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methylcyclohexane	108-87-2	6	6	0.0023	0.0049	0.0085	NESV	---	---	Yes	No ESV Available
Methylene Chloride	75-09-2	6	1	0.0011	0.0011	0.0011	0.159	0	<1	No	[Maximum] < ESV
Styrene	100-42-5	6	0	---	---	---	0.254	---	---	No	100% Non-Detect
Tert-Butyl Methyl Ether	1634-04-4	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Tetrachloroethylene (PCE)	127-18-4	6	1	0.00021	0.00021	0.00021	0.468	0	<1	No	[Maximum] < ESV
Toluene	108-88-3	6	6	0.0019	0.0046	0.011	1.22	0	<1	No	[Maximum] < ESV
Trans-1,2-Dichloroethene	156-60-5	6	0	---	---	---	0.654	---	---	No	100% Non-Detect
Trans-1,3-Dichloropropene	10061-02-6	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Trichloroethylene (TCE)	79-01-6	6	0	---	---	---	0.0969	---	---	No	100% Non-Detect
Trichlorofluoromethane	75-69-4	6	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vinyl Chloride	75-01-4	6	0	---	---	---	0.202	---	---	No	100% Non-Detect
M,P-Xylene	179601-23-1	6	6	0.00065	0.00184	0.0043	0.0252	0	<1	No	[Maximum] < ESV
O-Xylene (1,2-Dimethylbenzene)	95-47-6	6	6	0.00019	0.00055	0.0012	0.433	0	<1	No	[Maximum] < ESV
Total Xylene - 1/2MDL	1330-20-7	6	6	0.00084	0.00239	0.0055	0.433	0	<1	No	[Maximum] < ESV
Total Xylene - MDL	1330-20-7	6	6	0.00084	0.00239	0.0055	0.433	0	<1	No	[Maximum] < ESV
Total Xylene - Zero	1330-20-7	6	6	0.00084	0.00239	0.0055	0.433	0	<1	No	[Maximum] < ESV
Physicochemical Parameters											
Moisture, Percent	---	8	8	5	32	72	NESV	---	---	---	---
pH (s.u.)	---	6	6	7.5	7.7	8	NESV	---	---	---	---
Total Organic Carbon	7440440	32	27	153	13278	61800	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List

Table B-23
Screening-Level Ecological Exposure Estimate for Surface Water
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (ug/L)												
Aluminum	7429-90-5	U	28	18	17.6	34.5	85.5	87	0	<1	No	[Maximum] < ESV
Aluminum	7429-90-5	F	16	0	---	---	---	87	---	---	No	100% Non-Detect
Antimony	7440-36-0	U	28	4	0.64	0.71	0.78	30	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	F	16	0	---	---	---	30	---	---	No	100% Non-Detect
Arsenic	7440-38-2	U	28	0	---	---	---	5	---	---	No	100% Non-Detect
Arsenic	7440-38-2	F	16	0	---	---	---	3.1	---	---	No	100% Non-Detect
Barium	7440-39-3	U	28	28	85.9	104.7	130	4	28	32.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	16	16	85.9	99.7	117	4	16	29.3	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	28	0	---	---	---	0.66	---	---	No	100% Non-Detect
Beryllium	7440-41-7	F	16	0	---	---	---	0.66	---	---	No	100% Non-Detect
Cadmium	7440-43-9	U	28	0	---	---	---	0.233	---	---	No	100% Non-Detect
Cadmium	7440-43-9	F	16	0	---	---	---	0.233	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	U	28	2	8.9	23.3	37.7	8.9	1	4.2	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	F	16	0	---	---	---	8.9	---	---	No	100% Non-Detect
Cobalt	7440-48-4	U	28	0	---	---	---	5.1	---	---	No	100% Non-Detect
Cobalt	7440-48-4	F	16	0	---	---	---	5.1	---	---	No	100% Non-Detect
Copper	7440-50-8	U	28	9	1.9	4.3	8.5	0.23	9	37	Yes	[Maximum] > ESV
Copper	7440-50-8	F	16	0	---	---	---	0.23	---	---	No	100% Non-Detect
Iron	7439-89-6	U	28	3	100	178	304	300	1	1	Yes	[Maximum] > ESV
Iron	7439-89-6	F	16	0	---	---	---	158	---	---	No	100% Non-Detect
Lead	7439-92-1	U	28	1	0.41	0.41	0.41	5.741	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	F	16	0	---	---	---	4.143	---	---	No	100% Non-Detect
Manganese	7439-96-5	U	28	28	3.5	8.4	14.7	120	0	<1	No	[Maximum] < ESV
Manganese	7439-96-5	F	16	13	2.7	3.9	5.5	120	0	<1	No	[Maximum] < ESV
Mercury	7439-97-6	U	28	0	---	---	---	0.026	---	---	No	100% Non-Detect
Mercury	7439-97-6	F	16	0	---	---	---	0.026	---	---	No	100% Non-Detect
Nickel	7440-02-0	U	28	0	---	---	---	77.223	---	---	No	100% Non-Detect
Nickel	7440-02-0	F	16	0	---	---	---	5	---	---	No	100% Non-Detect
Selenium	7782-49-2	U	28	0	---	---	---	1	---	---	No	100% Non-Detect
Selenium	7782-49-2	F	16	0	---	---	---	3.1	---	---	No	100% Non-Detect
Silver	7440-22-4	U	28	0	---	---	---	0.25	---	---	No	100% Non-Detect
Silver	7440-22-4	F	16	0	---	---	---	0.12	---	---	No	100% Non-Detect
Thallium	7440-28-0	U	28	0	---	---	---	0.8	---	---	No	100% Non-Detect
Thallium	7440-28-0	F	16	0	---	---	---	12	---	---	No	100% Non-Detect
Vanadium	7440-62-2	U	28	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vanadium	7440-62-2	F	16	0	---	---	---	20	---	---	No	100% Non-Detect
Zinc	7440-66-6	U	28	2	13.5	14.9	16.4	177.484	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	F	16	1	25.4	25.4	25.4	7	1	3.6	Yes	[Maximum] > ESV
Other Inorganic Parameters (ug/L unless otherwise noted)												
Chloride (As Cl)	16887-00-6	U	28	28	1370	2021	3100	120000	0	<1	No	[Maximum] < ESV
Cyanide	57-12-5	U	32	7	2	5	15	5.2	2	2.9	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	8	0	---	---	---	5.2	---	---	No	100% Non-Detect
Cyanide (Free)	FREE CN	U	20	2	1.9	4.8	7.7	5	1	1.5	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	F	2	0	---	---	---	5	---	---	No	100% Non-Detect
Fluoride	16984-48-8	U	28	22	55.8	113.9	137	120	11	1.1	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	4	4	121	128	131	120	4	1.1	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	28	7	47.4	67	125	718.038	0	<1	No	[Maximum] < ESV
Essential Nutrients (ug/L)												

Table B-23
Screening-Level Ecological Exposure Estimate for Surface Water
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Calcium	7440-70-2	U	28	28	43100	50525	56800	116000	0	<1	No	Essential Nutrient
Calcium	7440-70-2	F	16	16	44500	48538	50900	116000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	U	28	28	10700	13221	16800	82000	0	<1	No	Essential Nutrient
Magnesium	7439-95-4	F	16	16	10500	12381	14800	82000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	U	28	28	367	473	656	53000	0	<1	No	Essential Nutrient
Potassium	7440-09-7	F	16	16	389	426	478	53000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	U	28	28	2010	2758	5530	680000	0	<1	No	Essential Nutrient
Sodium	7440-23-5	F	16	16	1910	2519	5570	680000	0	<1	No	Essential Nutrient
Physicochemical Parameters												
Alkalinity, Total (As CaCO3)	---	U	28	28	165000	186714	208000	NESV	---	---	---	---
Dissolved Organic Carbon	---	F	15	15	1070	1332	1740	NESV	---	---	---	---
Dissolved Oxygen	---	U	32	32	3850	12254	19020	NESV	---	---	---	---
Hardness (As CaCO3)	---	U	28	28	159000	182071	208000	NESV	---	---	---	---
Oxidation-Reduction Potential (mv)	---	U	32	32	49	152	278	NESV	---	---	---	---
pH (s.u.)	---	U	28	28	6.22	7.46	8.28	NESV	---	---	---	---
Specific Conductance (ms/cm)	---	U	32	32	0.208	0.345	0.395	NESV	---	---	---	---
Temperature (°C)	---	U	32	32	2.57	8.63	18.83	NESV	---	---	---	---
Total Organic Carbon	---	U	12	12	1100	1383	1700	NESV	---	---	---	---
Total Dissolved Solids	---	U	28	28	128000	196357	281000	NESV	---	---	---	---
Total Suspended Solids	---	U	28	16	1000	3331	19000	NESV	---	---	---	---
Turbidity (NTU)	---	U	28	28	0	1	9	NESV	---	---	---	---
Other Nutrients (ug/L)												
Nitrogen, Nitrite + Nitrate	NO3NO2N	U	28	16	113	526	2580	NESV	---	---	No	Other Nutrient
Phosphorus, Total Orthophosphate (As P)	---	U	24	4	136	140	143	NESV	---	---	No	Other Nutrient
Sulfate (As SO4)	14808-79-8	U	28	28	1590	2300	3320	NESV	---	---	No	Other Nutrient
Sulfide	18496-25-8	U	16	0	---	---	---	NESV	---	---	No	Other Nutrient

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
F: Filtered

Table B-24
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	9	9	6900	10157	12600	26000	0	<1	No	[Maximum] < ESV
Antimony	7440-36-0	9	0	---	---	---	2	---	---	No	100% Non-Detect
Arsenic	7440-38-2	9	9	1.8	2.6	4.2	9.79	0	<1	No	[Maximum] < ESV
Barium	7440-39-3	9	9	20.2	122.8	249	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	9	9	0.21	0.36	0.68	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	9	0	---	---	---	0.583	---	---	No	100% Non-Detect
Chromium, Total	7440-47-3	9	9	6.9	10.1	13	36.2	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	9	9	3.2	5	6.5	50	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	9	9	3.3	9.2	20.8	28	0	<1	No	[Maximum] < ESV
Iron	7439-89-6	9	9	7770	12317	16400	20000	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	9	9	4.9	6.4	10.3	35.8	0	<1	No	[Maximum] < ESV
Manganese	7439-96-5	9	9	67.3	252.3	571	460	1	1.2	Yes	[Maximum] > ESV
Mercury	7439-97-6	9	3	0.032	0.037	0.044	0.174	0	<1	No	[Maximum] < ESV
Nickel	7440-02-0	9	9	6.9	10	13.8	19.5	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	9	1	1.8	1.8	1.8	2	0	<1	No	[Maximum] < ESV
Silver	7440-22-4	9	0	---	---	---	0.5	---	---	No	100% Non-Detect
Thallium	7440-28-0	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Vanadium	7440-62-2	9	9	4.6	7.1	8.8	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	9	9	37.3	47.6	58.5	98	0	<1	No	[Maximum] < ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	9	4	0.1	0.2	0.2	0.0001	4	2400	Yes	[Maximum] > ESV
Fluoride	16984-48-8	9	3	1.41	1.58	1.71	290.2	0	<1	No	[Maximum] < ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	9	9	1120	15558	37000	NESV	---	---	Yes	Essential Nutrient
Magnesium	7439-95-4	9	9	5410	9070	13700	NESV	---	---	Yes	Essential Nutrient
Potassium	7440-09-7	9	9	177	658	1230	NESV	---	---	Yes	Essential Nutrient
Sodium	7440-23-5	9	5	40.2	103.3	154	NESV	---	---	Yes	Essential Nutrient
Pesticides (mg/kg)											
Aldrin	309-00-2	3	0	---	---	---	0.002	---	---	No	100% Non-Detect
Alpha Bhc (Alpha Hexachlorocyclohexane)	319-84-6	3	0	---	---	---	0.006	---	---	No	100% Non-Detect
Alpha Endosulfan	959-98-8	3	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	3	0	---	---	---	0.005	---	---	No	100% Non-Detect
Beta Endosulfan	33213-65-9	3	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
cis-Chlordane	5103-71-9	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
Delta BHC (Delta Hexachlorocyclohexane)	319-86-8	3	0	---	---	---	0.1388	---	---	No	100% Non-Detect
Dieldrin	60-57-1	3	0	---	---	---	0.0019	---	---	No	100% Non-Detect
Endosulfan Sulfate	1031-07-8	3	0	---	---	---	0.00000642	---	---	No	100% Non-Detect
Endrin	72-20-8	3	0	---	---	---	0.00222	---	---	No	100% Non-Detect
Endrin Aldehyde	7421-93-4	3	0	---	---	---	0.004428	---	---	No	100% Non-Detect
Endrin Ketone	53494-70-5	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
Gamma Bhc (Lindane)	58-89-9	3	0	---	---	---	0.00237	---	---	No	100% Non-Detect
Heptachlor	76-44-8	3	0	---	---	---	0.0006	---	---	No	100% Non-Detect
Heptachlor Epoxide	1024-57-3	3	0	---	---	---	0.00247	---	---	No	100% Non-Detect

Table B-24
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Methoxychlor	72-43-5	3	0	---	---	---	0.0136	---	---	No	100% Non-Detect
P,P'-DDD	72-54-8	3	0	---	---	---	0.00488	---	---	No	100% Non-Detect
P,P'-DDE	72-55-9	3	0	---	---	---	0.00316	---	---	No	100% Non-Detect
P,P'-DDT	50-29-3	3	0	---	---	---	0.00416	---	---	No	100% Non-Detect
Toxaphene	8001-35-2	3	0	---	---	---	0.000077	---	---	No	100% Non-Detect
trans-Chlordane	5103-74-2	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1016 (Aroclor 1016)	12674-11-2	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1221 (Aroclor 1221)	11104-28-2	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1232 (Aroclor 1232)	11141-16-5	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1242 (Aroclor 1242)	53469-21-9	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1248 (Aroclor 1248)	12672-29-6	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1254 (Aroclor 1254)	11097-69-1	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1260 (Aroclor 1260)	11096-82-5	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1262 (Aroclor 1262)	37324-23-5	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
PCB-1268 (Aroclor 1268)	11100-14-4	3	0	---	---	---	NESV	---	---	No	100% Non-Detect
Polychlorinated Biphenyl (PCBs)	1336-36-3	3	0	---	---	---	0.032	---	---	No	100% Non-Detect
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	9	1	0.0038	0.0038	0.0038	0.0202	0	<1	No	[Maximum] < ESV
Acenaphthene	83-32-9	9	2	0.0058	0.0084	0.011	0.00671	1	1.6	Yes	[Maximum] > ESV
Acenaphthylene	208-96-8	9	3	0.011	0.022	0.033	0.00587	3	5.6	Yes	[Maximum] > ESV
Anthracene	120-12-7	9	3	0.026	0.042	0.051	0.01	3	5.1	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	9	9	0.0023	0.0832	0.19	0.031	6	6.1	Yes	[Maximum] > ESV
Fluorene	86-73-7	9	2	0.013	0.021	0.028	0.01	2	2.8	Yes	[Maximum] > ESV
Naphthalene	91-20-3	9	0	---	---	---	0.015	---	---	No	100% Non-Detect
Phenanthrene	85-01-8	9	8	0.0028	0.0989	0.21	0.019	6	11.1	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	9	6	0.0032	0.0547	0.094	0.032	5	2.9	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	9	5	0.0034	0.0655	0.12	0.016	4	7.5	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	9	5	0.0035	0.0649	0.12	9.79	0	<1	No	[Maximum] < ESV
Benzo(G,H,I)Perylene	191-24-2	9	4	0.03	0.06	0.08	0.016	4	5.1	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	9	3	0.014	0.028	0.04	0.24	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	9	8	0.0052	0.0644	0.13	0.027	6	4.8	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	9	2	0.0066	0.007	0.0075	0.01	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	9	4	0.022	0.049	0.087	0.017	4	5.1	Yes	[Maximum] > ESV
Pyrene	129-00-0	9	7	0.0058	0.0867	0.16	0.044	5	3.6	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	9	9	0.01685	0.54528	1.1885	0.26	6	4.6	Yes	[Maximum] > ESV
Total PAHs - MDL	---	9	9	0.0286	0.6361	1.345	0.26	6	5.2	Yes	[Maximum] > ESV
Total PAHs - Zero	---	9	9	0.0051	0.4545	1.085	0.26	5	4.2	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
1,2,4,5-Tetrachlorobenzene	95-94-3	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
1,4-Dioxane (P-Dioxane)	123-91-1	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
2,3,4,6-Tetrachlorophenol	58-90-2	9	0	---	---	---	0.129	---	---	No	100% Non-Detect
2,4,5-Trichlorophenol	95-95-4	9	0	---	---	---	0.288	---	---	No	100% Non-Detect
2,4,6-Trichlorophenol	88-06-2	9	0	---	---	---	0.208	---	---	No	100% Non-Detect

Table B-24
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
2,4-Dichlorophenol	120-83-2	9	0	---	---	---	0.0817	---	---	No	100% Non-Detect
2,4-Dimethylphenol	105-67-9	9	0	---	---	---	0.029	---	---	No	100% Non-Detect
2,4-Dinitrophenol	51-28-5	9	0	---	---	---	0.00621	---	---	No	100% Non-Detect
2,4-Dinitrotoluene	121-14-2	9	0	---	---	---	0.0144	---	---	No	100% Non-Detect
2,6-Dinitrotoluene	606-20-2	9	0	---	---	---	0.0398	---	---	No	100% Non-Detect
2-Chloronaphthalene	91-58-7	9	0	---	---	---	0.417	---	---	No	100% Non-Detect
2-Chlorophenol	95-57-8	9	0	---	---	---	0.02716	---	---	No	100% Non-Detect
2-Methylphenol (O-Cresol)	95-48-7	9	0	---	---	---	0.011856	---	---	No	100% Non-Detect
2-Nitroaniline	88-74-4	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
2-Nitrophenol	88-75-5	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
3- And 4- Methylphenol (Total)	106445	3	0	---	---	---	0.0202	---	---	No	100% Non-Detect
3,3'-Dichlorobenzidine	91-94-1	9	0	---	---	---	0.127	---	---	No	100% Non-Detect
3-Nitroaniline	99-09-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
4,6-Dinitro-2-Methylphenol	534-52-1	9	0	---	---	---	0.104	---	---	No	100% Non-Detect
4-Bromophenyl Phenyl Ether	101-55-3	9	0	---	---	---	0.255	---	---	No	100% Non-Detect
4-Chloro-3-Methylphenol	59-50-7	9	0	---	---	---	0.388	---	---	No	100% Non-Detect
4-Chloroaniline	106-47-8	9	0	---	---	---	0.146	---	---	No	100% Non-Detect
4-Chlorophenyl Phenyl Ether	7005-72-3	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitroaniline	100-01-6	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
4-Nitrophenol	100-02-7	9	0	---	---	---	0.013	---	---	No	100% Non-Detect
Acetophenone	98-86-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Atrazine	1912-24-9	9	0	---	---	---	0.00662	---	---	No	100% Non-Detect
Benzaldehyde	100-52-7	9	3	0.15	0.16	0.17	NESV	---	---	Yes	No ESV Available
Benzyl Butyl Phthalate	85-68-7	9	0	---	---	---	1.97	---	---	No	100% Non-Detect
Biphenyl (Diphenyl)	92-52-4	9	0	---	---	---	1.22	---	---	No	100% Non-Detect
Bis(2-Chloroethoxy) Methane	111-91-1	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	9	0	---	---	---	3.52	---	---	No	100% Non-Detect
Bis(2-Chloroisopropyl) Ether	108-60-1	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Bis(2-Ethylhexyl) Phthalate	117-81-7	9	1	0.04	0.04	0.04	0.18	0	<1	No	[Maximum] < ESV
Caprolactam	105-60-2	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Carbazole	86-74-8	9	2	0.0049	0.0073	0.0098	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	9	1	0.0031	0.0031	0.0031	0.300736	0	<1	No	[Maximum] < ESV
Diethyl Phthalate	84-66-2	9	0	---	---	---	0.295	---	---	No	100% Non-Detect
Dimethyl Phthalate	131-11-3	9	0	---	---	---	NESV	---	---	No	100% Non-Detect
Di-N-Butyl Phthalate	84-74-2	9	0	---	---	---	1.1989	---	---	No	100% Non-Detect
Di-N-Octylphthalate	117-84-0	9	0	---	---	---	16.8858	---	---	No	100% Non-Detect
Hexachlorobenzene	118-74-1	9	0	---	---	---	0.02	---	---	No	100% Non-Detect
Hexachlorobutadiene	87-68-3	9	0	---	---	---	0.0265	---	---	No	100% Non-Detect
Hexachlorocyclopentadiene	77-47-4	9	0	---	---	---	0.901	---	---	No	100% Non-Detect
Hexachloroethane	67-72-1	9	0	---	---	---	0.2136	---	---	No	100% Non-Detect
Isophorone	78-59-1	9	2	0.06	0.07	0.08	0.432	0	<1	No	[Maximum] < ESV
Nitrobenzene	98-95-3	9	0	---	---	---	0.145	---	---	No	100% Non-Detect
N-Nitrosodi-N-Propylamine	621-64-7	9	0	---	---	---	NESV	---	---	No	100% Non-Detect

Table B-24
Screening-Level Ecological Exposure Estimate for Bulk Sediment (0-0.5 feet)
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Screening-Level Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
N-Nitrosodiphenylamine	86-30-6	9	0	---	---	---	0.516	---	---	No	100% Non-Detect
Pentachlorophenol	87-86-5	9	0	---	---	---	0.504	---	---	No	100% Non-Detect
Phenol	108-95-2	9	0	---	---	---	0.001152	---	---	No	100% Non-Detect
Physicochemical Parameters											
Moisture, Percent	---	3	3	34.9	45.6	52.8	NESV	---	---	---	---
Total Organic Carbon	7440440	9	9	1830	93702	277000	NESV	---	---	---	---

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
TAL: Target Analyte List
TCL: Target Compound List



Appendix C Calculated Dioxin Toxicity Equivalence Concentrations

Table C-1
Summary of Toxic Equivalency Factors
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Dioxin/Furan Compound	Toxicity Equivalency Factor (TEF)	
	TEF _{mammal}	TEF _{bird}
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1	1
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1	1
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	0.1	0.05
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	0.1	0.01
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	0.1	0.1
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01	0.001
Octachlorodibenzo-P-Dioxin	0.0003	0.0001
2,3,7,8-Tetrachlorodibenzofuran	0.1	1
1,2,3,7,8-Pentachlorodibenzofuran	0.03	0.1
2,3,4,7,8-Pentachlorodibenzofuran	0.3	1
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1	0.1
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1	0.1
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01	0.01
Octachlorodibenzofuran	0.0003	0.0001

Notes:

TEF: Toxicity Equivalency Factor

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
Main Plant Area						
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.205E-07
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.706E-07
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	7.046E-08
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	8.645E-08
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.271E-07
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.583E-08
CFMW-038-SO-0-0.5	6/25/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.891E-07
CFMW-038-SO-0-0.5	6/25/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.426E-07
CFMW-038-SO-0-0.5	6/25/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.356E-07
CFMW-038-SO-0-0.5	6/25/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.342E-07
CFMW-038-SO-0-0.5	6/25/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.766E-07
CFMW-038-SO-0-0.5	6/25/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	9.184E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	8.929E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.649E-07
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.530E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.089E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.118E-07
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.591E-08
CFMW-040-SO-0-0.5	6/28/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.044E-05
CFMW-040-SO-0-0.5	6/28/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.046E-05
CFMW-040-SO-0-0.5	6/28/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.043E-05
CFMW-040-SO-0-0.5	6/28/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.079E-06
CFMW-040-SO-0-0.5	6/28/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.091E-06
CFMW-040-SO-0-0.5	6/28/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.067E-06
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.036E-07
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.032E-07
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	7.092E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	8.387E-08
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.579E-07
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.314E-08
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.844E-06
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.502E-06
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.186E-06
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.541E-06
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	3.080E-06
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.002E-06
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.919E-07
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.651E-07
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.233E-07
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.198E-07
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.794E-07
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.489E-08
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.398E-06
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	4.218E-06
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.578E-06
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.802E-06
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	2.904E-06
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.700E-06
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.885E-07
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.981E-07
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.788E-07

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.716E-07
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.807E-07
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.625E-07
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.042E-06
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.484E-06
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.600E-06
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.170E-06
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.531E-06
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.086E-07
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-1/2MDL	8.774E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-MDL	1.775E-07
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-Zero	0
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-1/2MDL	5.843E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-MDL	1.208E-07
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-Zero	0
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	8.936E-08
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.781E-07
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	6.700E-09
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.458E-08
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.310E-07
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.700E-09
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	8.679E-06
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	9.384E-06
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	7.975E-06
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.018E-05
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.089E-05
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	9.477E-06
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	6.549E-08
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.336E-07
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	4.400E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.724E-08
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.021E-07
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.400E-09
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.085E-07
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.852E-07
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.457E-07
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.089E-07
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.810E-07
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.981E-08
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.108E-06
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.398E-06
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.817E-06
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.607E-06
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	3.897E-06
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.316E-06
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	6.674E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.266E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	6.099E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.813E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.237E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.406E-07
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.504E-06

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.819E-06
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.189E-06
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.644E-06
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.959E-06
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.329E-06
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.340E-07
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	4.094E-07
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.654E-07
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.649E-07
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	2.271E-07
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.097E-07
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.181E-06
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.750E-06
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.612E-06
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.215E-06
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.703E-06
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.280E-07
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.375E-06
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.429E-06
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.321E-06
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.338E-07
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.894E-07
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.790E-07
CFSB-087-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.184E-06
CFSB-087-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.473E-06
CFSB-087-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.896E-06
CFSB-087-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.126E-06
CFSB-087-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.418E-06
CFSB-087-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.329E-07
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.077E-06
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.790E-06
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.365E-06
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.260E-06
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.818E-06
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.008E-07
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.957E-06
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.268E-06
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.647E-06
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.068E-06
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.313E-06
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.223E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.261E-06
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.268E-06
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.257E-06
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	7.642E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	7.696E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.609E-07
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.029E-06
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.038E-06
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.021E-06
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.113E-06
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.122E-06

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.105E-06
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	5.725E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	9.407E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	5.246E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.225E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.943E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.734E-07
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.550E-07
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.527E-07
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.174E-07
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.257E-07
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.049E-06
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.242E-07
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.719E-07
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	6.928E-07
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.079E-07
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.056E-07
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.849E-07
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.615E-07
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.637E-06
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.038E-06
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.595E-06
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.054E-06
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.439E-06
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.012E-06
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	9.588E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	6.313E-07
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.517E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.024E-07
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	3.810E-07
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.080E-08
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	6.148E-07
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	9.608E-07
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	5.916E-07
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.468E-07
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.008E-07
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.318E-07
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.042E-07
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	9.054E-07
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	4.983E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	7.016E-08
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.249E-07
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.349E-09
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.003E-06
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.385E-06
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	9.118E-07
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	8.646E-07
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.465E-06
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.041E-07
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.085E-07
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	4.356E-07
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.923E-08

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.080E-07
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	2.387E-07
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.049E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	4.623E-07
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.015E-06
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	4.290E-07
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.453E-07
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.603E-07
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.237E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.634E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.203E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.227E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.079E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.058E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.764E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	5.045E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.006E-06
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	4.748E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	5.801E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.797E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.599E-07
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.045E-07
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.382E-06
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.321E-07
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.021E-07
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.613E-07
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.639E-07
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	5.718E-07
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.973E-06
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	4.867E-07
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	8.638E-07
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.312E-06
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.238E-07
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	4.224E-07
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.201E-06
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.885E-07
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.344E-07
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.767E-07
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.090E-07
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.449E-06
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.526E-06
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.385E-06
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.543E-06
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.620E-06
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.480E-06
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.449E-07
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.451E-07
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.307E-07
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.230E-07
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.878E-07
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.118E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.425E-07

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.943E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.285E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.041E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.042E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.942E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	4.382E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.353E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	4.278E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.427E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.158E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.385E-07
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.813E-06
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.863E-06
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.804E-06
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.076E-06
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.135E-06
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.067E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.194E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.203E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.187E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.509E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	3.518E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.502E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	5.516E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	5.809E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	5.494E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	7.832E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	8.125E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.810E-06
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.766E-06
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.817E-06
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.761E-06
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.039E-06
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.072E-06
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.033E-06
CFSB-235-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.702E-06
CFSB-235-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.720E-06
CFSB-235-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.697E-06
CFSB-235-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.759E-06
CFSB-235-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.777E-06
CFSB-235-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.754E-06
CFSB-236-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.740E-06
CFSB-236-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	4.244E-06
CFSB-236-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.627E-06
CFSB-236-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.752E-06
CFSB-236-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.860E-06
CFSB-236-SO-0.5-2	4/28/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.684E-06
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	7.738E-06
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	8.523E-06
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	7.654E-06
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.551E-05
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.561E-05

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.548E-05
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.022E-06
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	4.068E-06
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.984E-06
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	7.937E-07
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.835E-06
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.563E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.179E-05
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.235E-05
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.177E-05
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.964E-06
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.546E-06
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.947E-06
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.551E-06
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.945E-06
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.489E-06
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	4.727E-07
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	8.643E-07
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	4.103E-07
CFSB-293-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.841E-06
CFSB-293-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.261E-06
CFSB-293-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.767E-06
CFSB-293-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.275E-07
CFSB-293-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.033E-06
CFSB-293-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.548E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.316E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.347E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.618E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.622E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.898E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.005E-07
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.375E-07
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	6.556E-07
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	6.283E-08
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.316E-07
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.380E-07
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.843E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	4.237E-07
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.183E-06
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.947E-07
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.952E-07
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Mammal-MDL	9.376E-07
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.294E-07
Central Landfills Area						
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.608E-06
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	2.533E-06
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.473E-06
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.866E-06
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	2.753E-06
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.732E-06
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.614E-07
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	6.291E-07

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.027E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.376E-07
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.767E-07
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.446E-08
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	9.616E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.278E-06
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	9.415E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	5.456E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	8.544E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.263E-07
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.669E-06
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	4.394E-06
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.598E-06
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.905E-06
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	2.587E-06
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.835E-06
Western Undeveloped Area						
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	7.789E-07
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.213E-06
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	7.400E-07
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	6.845E-07
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.112E-06
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.630E-07
CFSB-168-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.167E-06
CFSB-168-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.846E-06
CFSB-168-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.152E-06
CFSB-168-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.176E-06
CFSB-168-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	1.662E-06
CFSB-168-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.170E-06
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.061E-07
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	5.249E-07
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.266E-08
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.121E-07
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	3.965E-07
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.449E-08
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.843E-07
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	5.874E-07
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.156E-07
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.935E-07
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.419E-07
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.448E-07
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.679E-07
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	5.781E-07
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.321E-07
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.257E-07
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.851E-07
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	9.473E-08
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.294E-07
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	6.621E-07
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.942E-07
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.123E-07
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.675E-07

Table C-2
Summary of Toxic Equivalency Concentration Results
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.821E-07
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.481E-07
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-MDL	8.949E-07
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-Zero	0
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.010E-07
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-MDL	2.917E-07
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-Zero	0
CFSB-215-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	3.272E-07
CFSB-215-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.410E-06
CFSB-215-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.319E-07
CFSB-215-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.077E-07
CFSB-215-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	8.718E-07
CFSB-215-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.587E-07
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.030E-06
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	3.054E-06
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.840E-06
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.954E-06
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	2.176E-06
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.840E-06
CFSB-216-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.490E-07
CFSB-216-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.255E-06
CFSB-216-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	6.962E-09
CFSB-216-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.206E-07
CFSB-216-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.577E-07
CFSB-216-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	5.246E-08
CFSB-217-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.823E-07
CFSB-217-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.060E-06
CFSB-217-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.733E-09
CFSB-217-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.401E-07
CFSB-217-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	3.428E-07
CFSB-217-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.038E-08
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	N	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.393E-07
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	N	TEC2,3,7,8-TCDD-Bird-MDL	6.210E-07
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	N	TEC2,3,7,8-TCDD-Bird-Zero	0
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	N	TEC2,3,7,8-TCDD-Mammal-1/2MDL	9.739E-08
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	N	TEC2,3,7,8-TCDD-Mammal-MDL	2.345E-07
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	N	TEC2,3,7,8-TCDD-Mammal-Zero	0
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.622E-07
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.358E-06
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	3.742E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.549E-07
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.423E-07
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	7.300E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	9.965E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.131E-06
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	7.874E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	7.236E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.538E-07
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.622E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.055E-07
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-MDL	8.414E-07
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Bird-Zero	0

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Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Detection (Y/N)	Constituent	TEC Result Value
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.431E-07
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-MDL	3.939E-07
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	N	TEC2,3,7,8-TCDD-Mammal-Zero	0
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.053E-07
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	1.144E-06
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.922E-08
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.138E-07
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	5.241E-07
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	8.359E-08
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.640E-07
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	6.357E-07
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.259E-07
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	1.591E-07
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.377E-07
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	1.329E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.710E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	8.730E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.325E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	3.286E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.398E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	3.037E-07
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	1.114E-07
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	5.209E-07
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	6.546E-08
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	9.965E-08
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	4.649E-07
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	6.639E-08
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.357E-07
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.957E-07
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Bird-Zero	1.934E-07
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.861E-07
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.835E-07
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.617E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Bird-1/2MDL	2.988E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Bird-MDL	7.456E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Bird-Zero	2.603E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Mammal-1/2MDL	2.786E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Mammal-MDL	6.464E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Y	TEC2,3,7,8-TCDD-Mammal-Zero	2.478E-07

Notes:

FD: Field Duplicate

N: Primary (Normal) sample

TEC: Toxic Equivalency Concentration

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
Main Plant Area										
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.60E-07	Y	0.01	0.01	2.60E-09	2.60E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.03E-06	Y	0.01	0.00	1.03E-08	1.03E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.10E-08	Y	0.01	0.01	4.10E-10	4.10E-10
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	7.30E-08	Y	0.10	0.10	7.30E-09	7.30E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.05E-08	N	0.10	0.05	1.05E-09	5.25E-10
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.20E-08	N	0.10	0.10	1.20E-09	1.20E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	7.50E-08	Y	0.10	0.01	7.50E-09	7.50E-10
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.10E-08	Y	0.10	0.10	9.10E-09	9.10E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.25E-08	N	0.03	0.10	3.75E-10	1.25E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.75E-08	N	1.00	1.00	1.75E-08	1.75E-08
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.30E-08	N	0.30	1.00	3.90E-09	1.30E-08
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	4.80E-08	Y	0.10	1.00	4.80E-09	4.80E-08
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.40E-08	N	1.00	1.00	1.40E-08	1.40E-08
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Octachlorodibenzofuran	9.30E-07	Y	0.00	0.00	2.79E-10	9.30E-11
CFMW-038-SO-0.5-2	6/25/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.18E-05	Y	0.00	0.00	3.54E-09	1.18E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.80E-07	Y	0.01	0.01	4.80E-09	4.80E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.01E-06	Y	0.01	0.00	2.01E-08	2.01E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	7.80E-08	Y	0.01	0.01	7.80E-10	7.80E-10
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.40E-07	Y	0.10	0.10	1.40E-08	1.40E-08
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	5.70E-08	Y	0.10	0.05	5.70E-09	2.85E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	7.60E-08	Y	0.10	0.10	7.60E-09	7.60E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.20E-07	Y	0.10	0.01	1.20E-08	1.20E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.10E-07	Y	0.10	0.10	1.10E-08	1.10E-08
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.40E-08	N	0.03	0.10	4.20E-10	1.40E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.05E-08	N	1.00	1.00	2.05E-08	2.05E-08
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.45E-08	N	0.30	1.00	4.35E-09	1.45E-08
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	8.90E-08	Y	0.10	1.00	8.90E-09	8.90E-08
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.45E-08	N	1.00	1.00	1.45E-08	1.45E-08
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	Octachlorodibenzofuran	1.99E-06	Y	0.00	0.00	5.97E-10	1.99E-10
CFMW-038-SO-0.0.5	6/25/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.12E-05	Y	0.00	0.00	6.36E-09	2.12E-09
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.10E-08	N	0.01	0.01	1.10E-10	1.10E-10
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.30E-08	N	0.01	0.00	1.30E-10	1.30E-11
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.35E-08	N	0.01	0.01	1.35E-10	1.35E-10
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.80E-08	Y	0.10	0.10	4.80E-09	4.80E-09
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.05E-08	N	0.10	0.05	1.05E-09	5.25E-10
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	8.50E-09	N	0.10	0.10	8.50E-10	8.50E-10
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.00E-08	N	0.10	0.01	1.00E-09	1.00E-10
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	9.00E-09	N	0.10	0.10	9.00E-10	9.00E-10
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	7.10E-08	Y	0.10	0.10	7.10E-09	7.10E-09
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.35E-08	N	0.03	0.10	4.05E-10	1.35E-09
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.70E-08	N	1.00	1.00	1.70E-08	1.70E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.10E-08	Y	0.10	0.10	3.10E-09	3.10E-09
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.40E-08	N	0.30	1.00	4.20E-09	1.40E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.20E-08	N	0.10	1.00	2.20E-09	2.20E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.70E-08	N	1.00	1.00	1.70E-08	1.70E-08
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Octachlorodibenzofuran	1.35E-08	N	0.00	0.00	4.05E-12	1.35E-12
CFMW-040-SO-0.5-2	6/28/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	3.02E-06	Y	0.00	0.00	9.06E-10	3.02E-10
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.69E-05	Y	0.01	0.01	2.69E-07	2.69E-07
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	9.98E-05	Y	0.01	0.00	9.98E-07	9.98E-08
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.70E-07	N	0.01	0.01	1.70E-09	1.70E-09
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.56E-06	Y	0.10	0.10	2.56E-07	2.56E-07
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.42E-06	Y	0.10	0.05	3.42E-07	1.71E-07
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	7.60E-07	Y	0.10	0.10	7.60E-08	7.60E-08
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	5.07E-06	Y	0.10	0.01	5.07E-07	5.07E-08
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.05E-07	N	0.10	0.10	1.05E-08	1.05E-08
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	4.60E-06	Y	0.10	0.10	4.60E-07	4.60E-07
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.59E-06	Y	0.03	0.10	4.77E-08	1.59E-07
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.21E-06	Y	1.00	1.00	1.21E-06	1.21E-06
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	5.40E-07	Y	0.10	0.10	5.40E-08	5.40E-08
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.71E-06	Y	0.30	1.00	5.13E-07	1.71E-06
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	5.26E-06	Y	0.10	1.00	5.26E-07	5.26E-06
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	5.80E-07	Y	1.00	1.00	5.80E-07	5.80E-07
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	Octachlorodibenzofuran	9.72E-05	Y	0.00	0.00	2.92E-08	9.72E-09
CFMW-040-SO-0.0-5	6/28/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	6.64E-04	Y	0.00	0.00	1.99E-07	6.64E-08
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.40E-08	N	0.01	0.01	1.40E-10	1.40E-10
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5.80E-07	Y	0.01	0.00	5.80E-09	5.80E-10
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.65E-08	N	0.01	0.01	1.65E-10	1.65E-10
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.30E-08	N	0.10	0.10	2.30E-09	2.30E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.60E-08	N	0.10	0.05	1.60E-09	8.00E-10
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.10E-08	N	0.10	0.10	2.10E-09	2.10E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.01	1.50E-09	1.50E-10
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.20E-08	N	0.10	0.10	2.20E-09	2.20E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	6.10E-08	Y	0.10	0.10	6.10E-09	6.10E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.90E-08	N	0.03	0.10	5.70E-10	1.90E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.60E-08	N	1.00	1.00	2.60E-08	2.60E-08
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.25E-08	N	0.10	0.10	2.25E-09	2.25E-09
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.00E-08	N	0.30	1.00	6.00E-09	2.00E-08
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.40E-08	N	0.10	1.00	1.40E-09	1.40E-08
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.45E-08	N	1.00	1.00	2.45E-08	2.45E-08
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzofuran	2.05E-08	N	0.00	0.00	6.15E-12	2.05E-12
CFSB-073-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	4.12E-06	Y	0.00	0.00	1.24E-09	4.12E-10
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.55E-05	Y	0.01	0.01	1.55E-07	1.55E-07
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5.09E-05	Y	0.01	0.00	5.09E-07	5.09E-08
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	9.45E-07	N	0.01	0.01	9.45E-09	9.45E-09
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.77E-06	Y	0.10	0.10	1.77E-07	1.77E-07
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.52E-06	Y	0.10	0.05	1.52E-07	7.60E-08
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.05E-06	Y	0.10	0.10	1.05E-07	1.05E-07
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.72E-06	Y	0.10	0.01	2.72E-07	2.72E-08
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.35E-07	N	0.10	0.10	2.35E-08	2.35E-08
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.47E-06	Y	0.10	0.10	2.47E-07	2.47E-07
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.50E-07	N	0.03	0.10	4.50E-09	1.50E-08
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.90E-07	N	1.00	1.00	2.90E-07	2.90E-07
CFSB-073-SO-0.0-5	6/1/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.47E-06	Y	0.10	0.10	1.47E-07	1.47E-07

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.55E-07	N	0.30	1.00	4.65E-08	1.55E-07
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.16E-06	Y	0.10	1.00	1.16E-07	1.16E-06
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.65E-07	N	1.00	1.00	1.65E-07	1.65E-07
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzofuran	3.68E-05	Y	0.00	0.00	1.10E-08	3.68E-09
CFSB-073-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	3.69E-04	Y	0.00	0.00	1.11E-07	3.69E-08
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.00E-08	N	0.01	0.01	1.00E-10	1.00E-10
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.72E-06	Y	0.01	0.00	1.72E-08	1.72E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.20E-08	N	0.01	0.01	1.20E-10	1.20E-10
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	8.80E-08	Y	0.10	0.10	8.80E-09	8.80E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.70E-08	N	0.10	0.05	1.70E-09	8.50E-10
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.00E-08	N	0.10	0.10	2.00E-09	2.00E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-07	Y	0.10	0.01	1.50E-08	1.50E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.10E-08	N	0.10	0.10	2.10E-09	2.10E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.90E-08	Y	0.10	0.10	9.90E-09	9.90E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.85E-08	N	0.03	0.10	5.55E-10	1.85E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.35E-08	N	1.00	1.00	2.35E-08	2.35E-08
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.15E-08	N	0.10	0.10	2.15E-09	2.15E-09
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.90E-08	N	0.30	1.00	5.70E-09	1.90E-08
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.00E-07	Y	0.10	1.00	1.00E-08	1.00E-07
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.70E-08	N	1.00	1.00	1.70E-08	1.70E-08
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzofuran	1.55E-08	N	0.00	0.00	4.65E-12	1.55E-12
CFSB-074-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.33E-05	Y	0.00	0.00	3.99E-09	1.33E-09
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.27E-05	Y	0.01	0.01	1.27E-07	1.27E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.71E-05	Y	0.01	0.00	4.71E-07	4.71E-08
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.77E-06	Y	0.01	0.01	1.77E-08	1.77E-08
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.04E-06	Y	0.10	0.10	2.04E-07	2.04E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	4.55E-08	N	0.10	0.05	4.55E-09	2.28E-09
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	9.60E-07	Y	0.10	0.10	9.60E-08	9.60E-08
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.13E-06	Y	0.10	0.01	3.13E-07	3.13E-08
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	9.00E-08	N	0.10	0.10	9.00E-09	9.00E-09
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.71E-06	Y	0.10	0.10	1.71E-07	1.71E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	9.00E-07	Y	0.03	0.10	2.70E-08	9.00E-08
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	4.40E-07	Y	1.00	1.00	4.40E-07	4.40E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	8.50E-08	N	0.10	0.10	8.50E-09	8.50E-09
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	8.70E-07	Y	0.30	1.00	2.61E-07	8.70E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	8.00E-07	N	0.10	1.00	8.00E-08	8.00E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.40E-07	Y	1.00	1.00	4.40E-07	4.40E-07
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzofuran	4.14E-05	Y	0.00	0.00	1.24E-08	4.14E-09
CFSB-074-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	4.00E-04	Y	0.00	0.00	1.20E-07	4.00E-08
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	7.20E-07	Y	0.01	0.01	7.20E-09	7.20E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.91E-06	Y	0.01	0.00	2.91E-08	2.91E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	8.00E-09	N	0.01	0.01	8.00E-11	8.00E-11
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.10E-07	Y	0.10	0.10	1.10E-08	1.10E-08
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.70E-08	Y	0.10	0.05	3.70E-09	1.85E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	6.20E-08	Y	0.10	0.10	6.20E-09	6.20E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.30E-07	Y	0.10	0.01	1.30E-08	1.30E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	8.00E-09	N	0.10	0.10	8.00E-10	8.00E-10
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.70E-08	Y	0.10	0.10	8.70E-09	8.70E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	7.50E-09	N	0.03	0.10	2.25E-10	7.50E-10

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.80E-08	Y	1.00	1.00	2.80E-08	2.80E-08
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.00E-08	Y	0.10	0.10	4.00E-09	4.00E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	6.50E-08	Y	0.30	1.00	1.95E-08	6.50E-08
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.40E-07	Y	0.10	1.00	2.40E-08	2.40E-07
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	8.00E-09	N	1.00	1.00	8.00E-09	8.00E-09
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzofuran	1.95E-06	Y	0.00	0.00	5.85E-10	1.95E-10
CFSB-075-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	2.49E-05	Y	0.00	0.00	7.47E-09	2.49E-09
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	6.16E-06	Y	0.01	0.01	6.16E-08	6.16E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.62E-05	Y	0.01	0.00	1.62E-07	1.62E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	5.70E-07	N	0.01	0.01	5.70E-09	5.70E-09
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	5.80E-07	Y	0.10	0.10	5.80E-08	5.80E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	6.70E-07	Y	0.10	0.05	6.70E-08	3.35E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.50E-07	Y	0.10	0.10	4.50E-08	4.50E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.15E-06	Y	0.10	0.01	1.15E-07	1.15E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.85E-07	N	0.10	0.10	1.85E-08	1.85E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.42E-06	Y	0.10	0.10	1.42E-07	1.42E-07
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.05E-07	N	0.03	0.10	3.15E-09	1.05E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.70E-07	N	1.00	1.00	1.70E-07	1.70E-07
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.75E-07	N	0.10	0.10	1.75E-08	1.75E-08
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.05E-07	N	0.30	1.00	3.15E-08	1.05E-07
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.22E-06	Y	0.10	1.00	1.22E-07	1.22E-06
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.15E-07	N	1.00	1.00	1.15E-07	1.15E-07
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzofuran	1.19E-05	Y	0.00	0.00	3.57E-09	1.19E-09
CFSB-075-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.08E-04	Y	0.00	0.00	3.24E-08	1.08E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.05E-08	N	0.01	0.01	1.05E-10	1.05E-10
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	9.00E-09	N	0.01	0.00	9.00E-11	9.00E-12
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.35E-08	N	0.01	0.01	1.35E-10	1.35E-10
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.40E-08	N	0.10	0.10	1.40E-09	1.40E-09
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.15E-08	N	0.10	0.05	1.15E-09	5.75E-10
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.10E-08	N	0.10	0.01	1.10E-09	1.10E-10
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.45E-08	N	0.10	0.10	1.45E-09	1.45E-09
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.50E-09	N	0.10	0.10	9.50E-10	9.50E-10
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.80E-08	N	0.03	0.10	5.40E-10	1.80E-09
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.95E-08	N	1.00	1.00	1.95E-08	1.95E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.40E-08	N	0.10	0.10	1.40E-09	1.40E-09
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.80E-08	N	0.30	1.00	5.40E-09	1.80E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.90E-08	N	0.10	1.00	1.90E-09	1.90E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.20E-08	N	1.00	1.00	2.20E-08	2.20E-08
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzofuran	1.25E-08	N	0.00	0.00	3.75E-12	1.25E-12
CFSB-079-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.20E-08	N	0.00	0.00	3.60E-12	1.20E-12
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-08	N	0.01	0.01	1.50E-10	1.50E-10
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.45E-08	N	0.01	0.00	1.45E-10	1.45E-11
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.85E-08	N	0.10	0.10	1.85E-09	1.85E-09
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.05	1.50E-09	7.50E-10
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	6.70E-08	Y	0.10	0.10	6.70E-09	6.70E-09
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.45E-08	N	0.10	0.01	1.45E-09	1.45E-10
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.85E-08	N	0.10	0.10	1.85E-09	1.85E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.10E-08	N	0.03	0.10	6.30E-10	2.10E-09
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.50E-08	N	1.00	1.00	2.50E-08	2.50E-08
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.80E-08	N	0.10	0.10	1.80E-09	1.80E-09
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.10E-08	N	0.30	1.00	6.30E-09	2.10E-08
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.20E-08	N	0.10	1.00	1.20E-09	1.20E-08
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.45E-08	N	1.00	1.00	1.45E-08	1.45E-08
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzofuran	1.25E-08	N	0.00	0.00	3.75E-12	1.25E-12
CFSB-079-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.25E-08	N	0.00	0.00	3.75E-12	1.25E-12
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	6.64E-05	Y	0.01	0.01	6.64E-07	6.64E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.12E-04	Y	0.01	0.00	3.12E-06	3.12E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	8.35E-07	N	0.01	0.01	8.35E-09	8.35E-09
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	9.63E-06	Y	0.10	0.10	9.63E-07	9.63E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.34E-06	Y	0.10	0.05	2.34E-07	1.17E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.86E-06	Y	0.10	0.10	2.86E-07	2.86E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.08E-05	Y	0.10	0.01	1.08E-06	1.08E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	6.10E-07	N	0.10	0.10	6.10E-08	6.10E-08
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	5.14E-06	Y	0.10	0.10	5.14E-07	5.14E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.10E-06	Y	0.03	0.10	6.30E-08	2.10E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.45E-07	N	1.00	1.00	3.45E-07	3.45E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.58E-06	Y	0.10	0.10	4.58E-07	4.58E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.88E-06	Y	0.30	1.00	5.64E-07	1.88E-06
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.02E-06	Y	0.10	1.00	2.02E-07	2.02E-06
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.90E-07	N	1.00	1.00	2.90E-07	2.90E-07
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzofuran	7.96E-05	Y	0.00	0.00	2.39E-08	7.96E-09
CFSB-080-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	4.35E-03	Y	0.00	0.00	1.31E-06	4.35E-07
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.35E-08	N	0.01	0.01	1.35E-10	1.35E-10
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.15E-08	N	0.01	0.00	1.15E-10	1.15E-11
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.70E-08	N	0.01	0.01	1.70E-10	1.70E-10
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.15E-08	N	0.10	0.10	1.15E-09	1.15E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.55E-08	N	0.10	0.05	1.55E-09	7.75E-10
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.40E-08	Y	0.10	0.10	4.40E-09	4.40E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.01	1.50E-09	1.50E-10
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.20E-08	N	0.10	0.10	1.20E-09	1.20E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.55E-08	N	0.03	0.10	4.65E-10	1.55E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.75E-08	N	1.00	1.00	1.75E-08	1.75E-08
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.15E-08	N	0.10	0.10	1.15E-09	1.15E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.55E-08	N	0.30	1.00	4.65E-09	1.55E-08
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	9.50E-09	N	0.10	1.00	9.50E-10	9.50E-09
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.10E-08	N	1.00	1.00	1.10E-08	1.10E-08
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzofuran	1.05E-08	N	0.00	0.00	3.15E-12	1.05E-12
CFSB-080-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.10E-08	N	0.00	0.00	3.30E-12	1.10E-12
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.35E-08	N	0.01	0.01	1.35E-10	1.35E-10
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.15E-08	N	0.01	0.00	1.15E-10	1.15E-11
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.75E-08	N	0.01	0.01	1.75E-10	1.75E-10
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.40E-07	Y	0.10	0.10	1.40E-08	1.40E-08
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.20E-08	N	0.10	0.05	1.20E-09	6.00E-10
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	Y	0.10	0.10	1.10E-08	1.10E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.10E-07	Y	0.10	0.01	1.10E-08	1.10E-09
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	7.70E-08	Y	0.10	0.10	7.70E-09	7.70E-09
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.00E-08	N	0.10	0.10	1.00E-09	1.00E-09
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.10E-07	Y	0.03	0.10	3.30E-09	1.10E-08
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.75E-08	N	1.00	1.00	1.75E-08	1.75E-08
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.85E-08	N	0.10	0.10	1.85E-09	1.85E-09
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.05E-08	N	0.30	1.00	6.15E-09	2.05E-08
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.00E-07	Y	0.10	1.00	1.00E-08	1.00E-07
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.10E-08	N	1.00	1.00	2.10E-08	2.10E-08
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzofuran	1.35E-08	N	0.00	0.00	4.05E-12	1.35E-12
CFSB-082-SO-0.5-2	6/1/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	9.36E-06	Y	0.00	0.00	2.81E-09	9.36E-10
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.17E-05	Y	0.01	0.01	2.17E-07	2.17E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.11E-04	Y	0.01	0.00	1.11E-06	1.11E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	6.45E-07	N	0.01	0.01	6.45E-09	6.45E-09
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.07E-06	Y	0.10	0.10	3.07E-07	3.07E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	8.60E-07	Y	0.10	0.05	8.60E-08	4.30E-08
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	9.80E-07	Y	0.10	0.10	9.80E-08	9.80E-08
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.13E-06	Y	0.10	0.01	3.13E-07	3.13E-08
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.90E-07	N	0.10	0.10	1.90E-08	1.90E-08
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.08E-06	Y	0.10	0.10	2.08E-07	2.08E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	6.60E-07	Y	0.03	0.10	1.98E-08	6.60E-08
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.50E-07	N	1.00	1.00	1.50E-07	1.50E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.70E-06	Y	0.10	0.10	1.70E-07	1.70E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	6.00E-07	Y	0.30	1.00	1.80E-07	6.00E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	7.90E-07	Y	0.10	1.00	7.90E-08	7.90E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.15E-07	N	1.00	1.00	1.15E-07	1.15E-07
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzofuran	3.10E-05	Y	0.00	0.00	9.30E-09	3.10E-09
CFSB-082-SO-0-0.5	6/1/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.73E-03	Y	0.00	0.00	5.19E-07	1.73E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.85E-06	Y	0.01	0.01	1.85E-08	1.85E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5.06E-06	Y	0.01	0.00	5.06E-08	5.06E-09
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.95E-08	N	0.01	0.01	2.95E-10	2.95E-10
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.30E-07	Y	0.10	0.10	3.30E-08	3.30E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.05E-08	N	0.10	0.05	2.05E-09	1.03E-09
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.25E-08	N	0.10	0.10	3.25E-09	3.25E-09
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	4.50E-07	Y	0.10	0.01	4.50E-08	4.50E-09
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.45E-08	N	0.10	0.10	3.45E-09	3.45E-09
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.10E-07	Y	0.10	0.10	3.10E-08	3.10E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.70E-07	Y	0.03	0.10	5.10E-09	1.70E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	9.40E-08	Y	1.00	1.00	9.40E-08	9.40E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.30E-07	Y	0.10	0.10	1.30E-08	1.30E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.55E-08	N	0.30	1.00	7.65E-09	2.55E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	3.90E-07	Y	0.10	1.00	3.90E-08	3.90E-07
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.40E-08	N	1.00	1.00	2.40E-08	2.40E-08
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Octachlorodibenzofuran	4.06E-06	Y	0.00	0.00	1.22E-09	4.06E-10
CFSB-084-SO-0.5-2	5/27/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	3.41E-05	Y	0.00	0.00	1.02E-08	3.41E-09
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	9.64E-06	Y	0.01	0.01	9.64E-08	9.64E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.48E-05	Y	0.01	0.00	2.48E-07	2.48E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	8.60E-07	Y	0.01	0.01	8.60E-09	8.60E-09
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.35E-06	Y	0.10	0.10	1.35E-07	1.35E-07

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	6.10E-07	Y	0.10	0.05	6.10E-08	3.05E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	7.80E-07	Y	0.10	0.10	7.80E-08	7.80E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.44E-06	Y	0.10	0.01	1.44E-07	1.44E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.50E-07	N	0.10	0.10	1.50E-08	1.50E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.00E-07	Y	0.10	0.10	8.00E-08	8.00E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	6.10E-07	Y	0.03	0.10	1.83E-08	6.10E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.55E-07	N	1.00	1.00	1.55E-07	1.55E-07
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	5.00E-07	Y	0.10	0.10	5.00E-08	5.00E-08
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	4.50E-07	Y	0.30	1.00	1.35E-07	4.50E-07
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	2.14E-06	Y	0.10	1.00	2.14E-07	2.14E-06
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.45E-07	N	1.00	1.00	1.45E-07	1.45E-07
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Octachlorodibenzofuran	2.22E-05	Y	0.00	0.00	6.66E-09	2.22E-09
CFSB-084-SO-0-0.5	5/27/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.79E-04	Y	0.00	0.00	5.37E-08	1.79E-08
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.00E-08	N	0.01	0.01	1.00E-10	1.00E-10
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.46E-06	Y	0.01	0.00	2.46E-08	2.46E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.20E-08	N	0.01	0.01	1.20E-10	1.20E-10
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.50E-07	Y	0.10	0.10	1.50E-08	1.50E-08
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	6.40E-08	Y	0.10	0.05	6.40E-09	3.20E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	9.10E-08	Y	0.10	0.10	9.10E-09	9.10E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-07	Y	0.10	0.01	1.50E-08	1.50E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.65E-08	N	0.10	0.10	1.65E-09	1.65E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.40E-08	Y	0.10	0.10	8.40E-09	8.40E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.70E-08	N	0.03	0.10	5.10E-10	1.70E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.05E-08	N	1.00	1.00	3.05E-08	3.05E-08
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.00E-08	Y	0.10	0.10	4.00E-09	4.00E-09
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.75E-08	N	0.30	1.00	5.25E-09	1.75E-08
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.20E-07	Y	0.10	1.00	2.20E-08	2.20E-07
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.70E-08	N	1.00	1.00	1.70E-08	1.70E-08
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzofuran	1.10E-08	N	0.00	0.00	3.30E-12	1.10E-12
CFSB-086-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.74E-05	Y	0.00	0.00	5.22E-09	1.74E-09
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.94E-06	Y	0.01	0.01	4.94E-08	4.94E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.34E-05	Y	0.01	0.00	2.34E-07	2.34E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	6.50E-07	Y	0.01	0.01	6.50E-09	6.50E-09
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.00E-07	N	0.10	0.10	2.00E-08	2.00E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.25E-07	N	0.10	0.05	1.25E-08	6.25E-09
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.80E-07	N	0.10	0.10	1.80E-08	1.80E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.57E-06	Y	0.10	0.01	1.57E-07	1.57E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.95E-07	N	0.10	0.10	1.95E-08	1.95E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.00E-07	Y	0.10	0.10	9.00E-08	9.00E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.10E-07	N	0.03	0.10	3.30E-09	1.10E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.95E-07	N	1.00	1.00	1.95E-07	1.95E-07
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.95E-07	N	0.10	0.10	1.95E-08	1.95E-08
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.15E-07	N	0.30	1.00	3.45E-08	1.15E-07
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.41E-06	Y	0.10	1.00	1.41E-07	1.41E-06
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.65E-07	N	1.00	1.00	1.65E-07	1.65E-07
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Octachlorodibenzofuran	1.11E-05	Y	0.00	0.00	3.33E-09	1.11E-09
CFSB-086-SO-0-0.5	5/26/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.56E-04	Y	0.00	0.00	4.68E-08	1.56E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.29E-06	Y	0.01	0.01	1.29E-08	1.29E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5.19E-06	Y	0.01	0.00	5.19E-08	5.19E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.40E-08	N	0.01	0.01	2.40E-10	2.40E-10
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.00E-07	Y	0.10	0.10	4.00E-08	4.00E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.00E-08	N	0.10	0.05	2.00E-09	1.00E-09
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.40E-07	Y	0.10	0.10	1.40E-08	1.40E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.70E-07	Y	0.10	0.01	3.70E-08	3.70E-09
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	5.20E-08	Y	0.10	0.10	5.20E-09	5.20E-09
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.90E-07	Y	0.10	0.10	1.90E-08	1.90E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.30E-07	Y	0.03	0.10	6.90E-09	2.30E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.30E-08	N	1.00	1.00	3.30E-08	3.30E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.40E-07	Y	0.10	0.10	1.40E-08	1.40E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.40E-07	Y	0.30	1.00	7.20E-08	2.40E-07
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	9.40E-07	Y	0.10	1.00	9.40E-08	9.40E-07
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.95E-08	N	1.00	1.00	1.95E-08	1.95E-08
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzofuran	3.09E-06	Y	0.00	0.00	9.27E-10	3.09E-10
CFSB-087-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	3.74E-05	Y	0.00	0.00	1.12E-08	3.74E-09
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.10E-06	Y	0.01	0.01	3.10E-08	3.10E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.64E-05	Y	0.01	0.00	1.64E-07	1.64E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	7.50E-08	N	0.01	0.01	7.50E-10	7.50E-10
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.40E-07	N	0.10	0.10	1.40E-08	1.40E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	8.50E-08	N	0.10	0.05	8.50E-09	4.25E-09
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.25E-07	N	0.10	0.10	1.25E-08	1.25E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.19E-06	Y	0.10	0.01	1.19E-07	1.19E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.35E-07	N	0.10	0.10	1.35E-08	1.35E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.80E-07	Y	0.10	0.10	9.80E-08	9.80E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	4.70E-07	Y	0.03	0.10	1.41E-08	4.70E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.30E-07	N	1.00	1.00	1.30E-07	1.30E-07
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.35E-07	N	0.10	0.10	1.35E-08	1.35E-08
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	5.20E-07	Y	0.30	1.00	1.56E-07	5.20E-07
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	2.16E-06	Y	0.10	1.00	2.16E-07	2.16E-06
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.00E-07	N	1.00	1.00	1.00E-07	1.00E-07
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	Octachlorodibenzofuran	7.90E-06	Y	0.00	0.00	2.37E-09	7.90E-10
CFSB-087-SO-0.0-5	5/26/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.08E-04	Y	0.00	0.00	3.24E-08	1.08E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.63E-06	Y	0.01	0.01	5.63E-08	5.63E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.96E-05	Y	0.01	0.00	1.96E-07	1.96E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.10E-07	N	0.01	0.01	1.10E-09	1.10E-09
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	5.20E-07	Y	0.10	0.10	5.20E-08	5.20E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	5.60E-07	Y	0.10	0.05	5.60E-08	2.80E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.50E-07	N	0.10	0.10	1.50E-08	1.50E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	9.60E-07	Y	0.10	0.01	9.60E-08	9.60E-09
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.60E-07	N	0.10	0.10	1.60E-08	1.60E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.70E-07	Y	0.10	0.10	9.70E-08	9.70E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.90E-07	N	0.03	0.10	5.70E-09	1.90E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.35E-07	N	1.00	1.00	2.35E-07	2.35E-07
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.60E-07	N	0.10	0.10	1.60E-08	1.60E-08
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.00E-07	N	0.30	1.00	6.00E-08	2.00E-07
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.09E-06	Y	0.10	1.00	1.09E-07	1.09E-06
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.10E-07	N	1.00	1.00	2.10E-07	2.10E-07
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzofuran	1.73E-05	Y	0.00	0.00	5.19E-09	1.73E-09
CFSB-088-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.11E-04	Y	0.00	0.00	3.33E-08	1.11E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	7.18E-06	Y	0.01	0.01	7.18E-08	7.18E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.13E-05	Y	0.01	0.00	2.13E-07	2.13E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	8.50E-08	N	0.01	0.01	8.50E-10	8.50E-10
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	9.20E-07	Y	0.10	0.10	9.20E-08	9.20E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.30E-07	Y	0.10	0.05	3.30E-08	1.65E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.05E-07	N	0.10	0.10	1.05E-08	1.05E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.25E-06	Y	0.10	0.01	1.25E-07	1.25E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.10E-07	N	0.10	0.10	1.10E-08	1.10E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	7.80E-07	Y	0.10	0.10	7.80E-08	7.80E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	8.00E-08	N	0.03	0.10	2.40E-09	8.00E-09
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.05E-07	N	1.00	1.00	1.05E-07	1.05E-07
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.80E-07	Y	0.10	0.10	2.80E-08	2.80E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	8.50E-08	N	0.30	1.00	2.55E-08	8.50E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.31E-06	Y	0.10	1.00	1.31E-07	1.31E-06
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	9.00E-08	N	1.00	1.00	9.00E-08	9.00E-08
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Octachlorodibenzofuran	2.32E-05	Y	0.00	0.00	6.96E-09	2.32E-09
CFSB-088-SO-0-0.5	5/26/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.45E-04	Y	0.00	0.00	4.35E-08	1.45E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.43E-06	Y	0.01	0.01	2.43E-08	2.43E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	9.04E-06	Y	0.01	0.00	9.04E-08	9.04E-09
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Heptachlorodibenzofuran	2.30E-08	N	0.01	0.01	2.30E-10	2.30E-10
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.10E-07	Y	0.10	0.10	3.10E-08	3.10E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.50E-07	Y	0.10	0.05	2.50E-08	1.25E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.90E-07	Y	0.10	0.10	1.90E-08	1.90E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	5.30E-07	Y	0.10	0.01	5.30E-08	5.30E-09
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.50E-08	N	0.10	0.10	2.50E-09	2.50E-09
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	4.60E-07	Y	0.10	0.10	4.60E-08	4.60E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.90E-08	N	0.03	0.10	5.70E-10	1.90E-09
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.20E-07	Y	1.00	1.00	2.20E-07	2.20E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.20E-07	Y	0.10	0.10	1.20E-08	1.20E-08
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.60E-07	Y	0.30	1.00	4.80E-08	1.60E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	6.00E-07	Y	0.10	1.00	6.00E-08	6.00E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.10E-07	Y	1.00	1.00	1.10E-07	1.10E-07
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzofuran	6.02E-06	Y	0.00	0.00	1.81E-09	6.02E-10
CFSB-092-SO-0.5-2	5/26/2016	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	6.81E-05	Y	0.00	0.00	2.04E-08	6.81E-09
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.18E-06	Y	0.01	0.01	4.18E-08	4.18E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.47E-05	Y	0.01	0.00	1.47E-07	1.47E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.90E-07	Y	0.01	0.01	4.90E-09	4.90E-09
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.50E-08	N	0.10	0.10	4.50E-09	4.50E-09
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.80E-07	Y	0.10	0.05	3.80E-08	1.90E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.20E-07	Y	0.10	0.10	4.20E-08	4.20E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	9.70E-07	Y	0.10	0.01	9.70E-08	9.70E-09
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.30E-08	N	0.10	0.10	4.30E-09	4.30E-09
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	6.70E-07	Y	0.10	0.10	6.70E-08	6.70E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.90E-07	Y	0.03	0.10	8.70E-09	2.90E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.60E-07	Y	1.00	1.00	2.60E-07	2.60E-07
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.10E-07	Y	0.10	0.10	3.10E-08	3.10E-08
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.90E-07	Y	0.30	1.00	8.70E-08	2.90E-07
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.06E-06	Y	0.10	1.00	1.06E-07	1.06E-06
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.40E-07	Y	1.00	1.00	1.40E-07	1.40E-07

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Octachlorodibenzofuran	1.01E-05	Y	0.00	0.00	3.03E-09	1.01E-09
CFSB-092-SO-0-0.5	5/26/2016	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.04E-04	Y	0.00	0.00	3.12E-08	1.04E-08
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.37E-06	Y	0.01	0.01	1.37E-08	1.37E-08
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5.59E-06	Y	0.01	0.00	5.59E-08	5.59E-09
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.65E-08	N	0.01	0.01	3.65E-10	3.65E-10
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.75E-08	N	0.10	0.10	4.75E-09	4.75E-09
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.90E-08	N	0.10	0.05	1.90E-09	9.50E-10
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.20E-07	Y	0.10	0.10	2.20E-08	2.20E-08
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.75E-08	N	0.10	0.01	1.75E-09	1.75E-10
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.70E-08	N	0.10	0.10	1.70E-09	1.70E-09
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.85E-08	N	0.03	0.10	5.55E-10	1.85E-09
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	9.60E-08	Y	1.00	1.00	9.60E-08	9.60E-08
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.60E-08	N	0.10	0.10	4.60E-09	4.60E-09
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.30E-07	Y	0.30	1.00	3.90E-08	1.30E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.50E-07	Y	0.10	1.00	2.50E-08	2.50E-07
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.80E-08	N	1.00	1.00	2.80E-08	2.80E-08
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	6.20E-06	Y	0.00	0.00	1.86E-09	6.20E-10
CFSB-189-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	6.65E-05	Y	0.00	0.00	2.00E-08	6.65E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.18E-06	Y	0.01	0.01	2.18E-08	2.18E-08
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.82E-05	Y	0.01	0.00	2.82E-07	2.82E-08
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.60E-08	N	0.01	0.01	4.60E-10	4.60E-10
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.85E-08	N	0.10	0.05	1.85E-09	9.25E-10
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.95E-08	N	0.10	0.10	4.95E-09	4.95E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.60E-07	Y	0.10	0.01	2.60E-08	2.60E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	6.50E-08	N	0.10	0.10	6.50E-09	6.50E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.65E-08	N	0.10	0.10	1.65E-09	1.65E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.65E-08	N	0.03	0.10	7.95E-10	2.65E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.85E-08	N	1.00	1.00	2.85E-08	2.85E-08
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	5.00E-08	N	0.10	0.10	5.00E-09	5.00E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.65E-08	N	0.30	1.00	7.95E-09	2.65E-08
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.85E-08	N	0.10	1.00	1.85E-09	1.85E-08
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	3.65E-08	N	1.00	1.00	3.65E-08	3.65E-08
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	2.20E-05	Y	0.00	0.00	6.60E-09	2.20E-09
CFSB-189-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	6.26E-04	Y	0.00	0.00	1.88E-07	6.26E-08
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.45E-08	N	0.01	0.01	2.45E-10	2.45E-10
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.81E-06	Y	0.01	0.00	4.81E-08	4.81E-09
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.95E-08	N	0.01	0.01	2.95E-10	2.95E-10
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.90E-08	N	0.10	0.10	3.90E-09	3.90E-09
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.45E-08	N	0.10	0.05	1.45E-09	7.25E-10
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.80E-07	Y	0.10	0.10	1.80E-08	1.80E-08
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.35E-08	N	0.10	0.01	1.35E-09	1.35E-10
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.60E-08	N	0.10	0.10	4.60E-09	4.60E-09
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.55E-08	N	0.03	0.10	4.65E-10	1.55E-09
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	8.00E-08	Y	1.00	1.00	8.00E-08	8.00E-08
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.75E-08	N	0.10	0.10	3.75E-09	3.75E-09
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.55E-08	N	0.30	1.00	4.65E-09	1.55E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.10E-08	N	0.10	1.00	1.10E-09	1.10E-08
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.10E-08	N	1.00	1.00	2.10E-08	2.10E-08
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	4.33E-06	Y	0.00	0.00	1.30E-09	4.33E-10
CFSB-190-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	4.69E-05	Y	0.00	0.00	1.41E-08	4.69E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	6.61E-06	Y	0.01	0.01	6.61E-08	6.61E-08
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.26E-05	Y	0.01	0.00	2.26E-07	2.26E-08
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	7.00E-08	N	0.01	0.01	7.00E-10	7.00E-10
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	7.10E-07	Y	0.10	0.10	7.10E-08	7.10E-08
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.35E-08	N	0.10	0.05	2.35E-09	1.18E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.80E-07	Y	0.10	0.10	4.80E-08	4.80E-08
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	8.90E-07	Y	0.10	0.01	8.90E-08	8.90E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	7.50E-08	N	0.10	0.10	7.50E-09	7.50E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.60E-07	Y	0.10	0.10	8.60E-08	8.60E-08
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.00E-08	N	0.03	0.10	6.00E-10	2.00E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.90E-07	Y	1.00	1.00	1.90E-07	1.90E-07
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	6.00E-08	N	0.10	0.10	6.00E-09	6.00E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	3.00E-07	Y	0.30	1.00	9.00E-08	3.00E-07
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	7.80E-07	Y	0.10	1.00	7.80E-08	7.80E-07
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.45E-08	N	1.00	1.00	2.45E-08	2.45E-08
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	2.39E-05	Y	0.00	0.00	7.17E-09	2.39E-09
CFSB-190-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.03E-04	Y	0.00	0.00	6.09E-08	2.03E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.20E-08	N	0.01	0.01	2.20E-10	2.20E-10
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.47E-06	Y	0.01	0.00	2.47E-08	2.47E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.65E-08	N	0.01	0.01	2.65E-10	2.65E-10
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.25E-08	N	0.10	0.10	3.25E-09	3.25E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.80E-08	N	0.10	0.05	1.80E-09	9.00E-10
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	Y	0.10	0.10	1.10E-08	1.10E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.70E-08	N	0.10	0.01	1.70E-09	1.70E-10
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.85E-08	N	0.10	0.10	3.85E-09	3.85E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.65E-08	N	0.10	0.10	1.65E-09	1.65E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.75E-08	N	0.03	0.10	5.25E-10	1.75E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.90E-08	N	1.00	1.00	1.90E-08	1.90E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.15E-08	N	0.10	0.10	3.15E-09	3.15E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.75E-08	N	0.30	1.00	5.25E-09	1.75E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	9.00E-09	N	0.10	1.00	9.00E-10	9.00E-09
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.00E-08	N	1.00	1.00	2.00E-08	2.00E-08
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Octachlorodibenzofuran	2.15E-08	N	0.00	0.00	6.45E-12	2.15E-12
CFSB-205-SO-0.5-2	9/26/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.70E-05	Y	0.00	0.00	5.10E-09	1.70E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.45E-08	N	0.01	0.01	1.45E-10	1.45E-10
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.63E-06	Y	0.01	0.00	3.63E-08	3.63E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.70E-08	N	0.01	0.01	1.70E-10	1.70E-10
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.05E-08	N	0.10	0.10	3.05E-09	3.05E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.35E-08	N	0.10	0.05	1.35E-09	6.75E-10
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.40E-07	Y	0.10	0.10	1.40E-08	1.40E-08
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.80E-07	Y	0.10	0.01	2.80E-08	2.80E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.60E-08	N	0.10	0.10	3.60E-09	3.60E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.60E-07	Y	0.10	0.10	2.60E-08	2.60E-08
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.15E-08	N	0.03	0.10	3.45E-10	1.15E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.30E-07	Y	1.00	1.00	1.30E-07	1.30E-07

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.95E-08	N	0.10	0.10	2.95E-09	2.95E-09
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.15E-08	N	0.30	1.00	3.45E-09	1.15E-08
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	3.60E-07	Y	0.10	1.00	3.60E-08	3.60E-07
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	5.20E-08	Y	1.00	1.00	5.20E-08	5.20E-08
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Octachlorodibenzofuran	1.35E-08	N	0.00	0.00	4.05E-12	1.35E-12
CFSB-205-SO-0-0.5	9/26/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	3.15E-05	Y	0.00	0.00	9.45E-09	3.15E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.30E-08	N	0.01	0.01	1.30E-10	1.30E-10
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.70E-08	N	0.01	0.00	1.70E-10	1.70E-11
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.50E-08	N	0.01	0.01	1.50E-10	1.50E-10
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.30E-08	Y	0.10	0.10	4.30E-09	4.30E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.40E-08	N	0.10	0.05	2.40E-09	1.20E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.10E-08	N	0.10	0.01	2.10E-09	2.10E-10
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.35E-08	N	0.10	0.10	1.35E-09	1.35E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.95E-08	N	0.10	0.10	1.95E-09	1.95E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.05E-08	N	0.03	0.10	6.15E-10	2.05E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.25E-08	N	1.00	1.00	2.25E-08	2.25E-08
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.35E-08	N	0.10	0.10	1.35E-09	1.35E-09
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.10E-08	N	0.30	1.00	6.30E-09	2.10E-08
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.50E-08	N	0.10	1.00	2.50E-09	2.50E-08
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.10E-08	N	1.00	1.00	2.10E-08	2.10E-08
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Octachlorodibenzofuran	1.91E-06	Y	0.00	0.00	5.73E-10	1.91E-10
CFSB-206-SO-0.5-2	6/22/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	4.92E-06	Y	0.00	0.00	1.48E-09	4.92E-10
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.92E-06	Y	0.01	0.01	1.92E-08	1.92E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.36E-05	Y	0.01	0.00	1.36E-07	1.36E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.55E-08	N	0.01	0.01	4.55E-10	4.55E-10
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.90E-07	Y	0.10	0.10	4.90E-08	4.90E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.40E-08	N	0.10	0.05	3.40E-09	1.70E-09
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.80E-07	Y	0.10	0.10	3.80E-08	3.80E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.00E-08	N	0.10	0.01	3.00E-09	3.00E-10
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.55E-08	N	0.10	0.10	2.55E-09	2.55E-09
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	7.50E-07	Y	0.10	0.10	7.50E-08	7.50E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.70E-08	N	0.03	0.10	8.10E-10	2.70E-09
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.00E-07	Y	1.00	1.00	3.00E-07	3.00E-07
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.60E-07	Y	0.10	0.10	4.60E-08	4.60E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	3.60E-07	Y	0.30	1.00	1.08E-07	3.60E-07
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	3.70E-08	N	0.10	1.00	3.70E-09	3.70E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.65E-08	N	1.00	1.00	4.65E-08	4.65E-08
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Octachlorodibenzofuran	3.82E-06	Y	0.00	0.00	1.15E-09	3.82E-10
CFSB-206-SO-0-0.5	6/22/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.06E-04	Y	0.00	0.00	3.18E-08	1.06E-08
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.60E-07	Y	0.01	0.01	4.60E-09	4.60E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.00E-06	Y	0.01	0.00	2.00E-08	2.00E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.40E-08	N	0.01	0.01	1.40E-10	1.40E-10
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	8.00E-08	Y	0.10	0.10	8.00E-09	8.00E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.05	1.50E-09	7.50E-10
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.35E-08	N	0.10	0.10	2.35E-09	2.35E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.35E-08	N	0.10	0.01	1.35E-09	1.35E-10
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.65E-08	N	0.10	0.10	2.65E-09	2.65E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.30E-07	Y	0.10	0.10	1.30E-08	1.30E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.80E-08	N	0.03	0.10	5.40E-10	1.80E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.50E-08	N	1.00	1.00	2.50E-08	2.50E-08
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.40E-08	N	0.10	0.10	2.40E-09	2.40E-09
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.85E-08	N	0.30	1.00	5.55E-09	1.85E-08
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.05E-08	N	0.10	1.00	1.05E-09	1.05E-08
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.50E-08	N	1.00	1.00	1.50E-08	1.50E-08
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	1.20E-06	Y	0.00	0.00	3.60E-10	1.20E-10
CFSB-207-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.51E-05	Y	0.00	0.00	4.53E-09	1.51E-09
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.86E-06	Y	0.01	0.01	1.86E-08	1.86E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	7.19E-06	Y	0.01	0.00	7.19E-08	7.19E-09
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.05E-08	N	0.01	0.01	2.05E-10	2.05E-10
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.50E-07	Y	0.10	0.10	2.50E-08	2.50E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.65E-08	N	0.10	0.05	1.65E-09	8.25E-10
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.80E-07	Y	0.10	0.10	1.80E-08	1.80E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	4.10E-07	Y	0.10	0.01	4.10E-08	4.10E-09
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.45E-08	N	0.10	0.10	4.45E-09	4.45E-09
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.50E-07	Y	0.10	0.10	3.50E-08	3.50E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.85E-08	N	0.03	0.10	5.55E-10	1.85E-09
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.30E-07	Y	1.00	1.00	1.30E-07	1.30E-07
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.50E-07	Y	0.10	0.10	1.50E-08	1.50E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.70E-07	Y	0.30	1.00	5.10E-08	1.70E-07
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.25E-08	N	0.10	1.00	1.25E-09	1.25E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.35E-08	N	1.00	1.00	1.35E-08	1.35E-08
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	4.99E-06	Y	0.00	0.00	1.50E-09	4.99E-10
CFSB-207-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	5.58E-05	Y	0.00	0.00	1.67E-08	5.58E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.70E-06	Y	0.01	0.01	2.70E-08	2.70E-08
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	9.78E-06	Y	0.01	0.00	9.78E-08	9.78E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.50E-08	N	0.01	0.01	3.50E-10	3.50E-10
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.80E-08	N	0.10	0.10	3.80E-09	3.80E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.90E-08	N	0.10	0.05	1.90E-09	9.50E-10
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.65E-08	N	0.10	0.10	3.65E-09	3.65E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	4.40E-07	Y	0.10	0.01	4.40E-08	4.40E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.10E-08	N	0.10	0.10	4.10E-09	4.10E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.30E-07	Y	0.10	0.10	3.30E-08	3.30E-08
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.60E-08	N	0.03	0.10	4.80E-10	1.60E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.10E-07	Y	1.00	1.00	1.10E-07	1.10E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.70E-08	N	0.10	0.10	3.70E-09	3.70E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.30E-07	Y	0.30	1.00	3.90E-08	1.30E-07
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.00E-08	N	0.10	1.00	1.00E-09	1.00E-08
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.25E-08	N	1.00	1.00	1.25E-08	1.25E-08
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	1.42E-05	Y	0.00	0.00	4.26E-09	1.42E-09
CFSB-208-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	7.11E-05	Y	0.00	0.00	2.13E-08	7.11E-09
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.27E-06	Y	0.01	0.01	3.27E-08	3.27E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.43E-05	Y	0.01	0.00	1.43E-07	1.43E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.65E-08	N	0.01	0.01	3.65E-10	3.65E-10
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.60E-07	Y	0.10	0.10	2.60E-08	2.60E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.50E-08	N	0.10	0.05	2.50E-09	1.25E-09
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.90E-07	Y	0.10	0.10	1.90E-08	1.90E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	5.70E-07	Y	0.10	0.01	5.70E-08	5.70E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.80E-08	N	0.10	0.10	2.80E-09	2.80E-09
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	5.00E-07	Y	0.10	0.10	5.00E-08	5.00E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.35E-08	N	0.03	0.10	4.05E-10	1.35E-09
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.30E-07	Y	1.00	1.00	1.30E-07	1.30E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.50E-07	Y	0.10	0.10	1.50E-08	1.50E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.70E-07	Y	0.30	1.00	5.10E-08	1.70E-07
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.10E-08	N	0.10	1.00	1.10E-09	1.10E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.30E-08	N	1.00	1.00	1.30E-08	1.30E-08
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	1.38E-05	Y	0.00	0.00	4.14E-09	1.38E-09
CFSB-208-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.07E-04	Y	0.00	0.00	3.21E-08	1.07E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.85E-08	N	0.01	0.01	1.85E-10	1.85E-10
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.08E-06	Y	0.01	0.00	3.08E-08	3.08E-09
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.15E-08	N	0.01	0.01	2.15E-10	2.15E-10
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.70E-07	Y	0.10	0.10	2.70E-08	2.70E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.50E-08	N	0.10	0.05	2.50E-09	1.25E-09
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.40E-07	Y	0.10	0.10	1.40E-08	1.40E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.20E-08	N	0.10	0.01	2.20E-09	2.20E-10
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.05E-08	N	0.10	0.10	2.05E-09	2.05E-09
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.05E-08	N	0.10	0.10	2.05E-09	2.05E-09
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.35E-08	N	0.03	0.10	7.05E-10	2.35E-09
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	8.60E-08	Y	1.00	1.00	8.60E-08	8.60E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.05E-08	N	0.10	0.10	2.05E-09	2.05E-09
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.40E-08	N	0.30	1.00	7.20E-09	2.40E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.10E-08	N	0.10	1.00	2.10E-09	2.10E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.70E-08	N	1.00	1.00	1.70E-08	1.70E-08
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Octachlorodibenzofuran	1.31E-06	Y	0.00	0.00	3.93E-10	1.31E-10
CFSB-213-SO-0.5-2	6/22/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.89E-05	Y	0.00	0.00	5.67E-09	1.89E-09
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.64E-06	Y	0.01	0.01	3.64E-08	3.64E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.13E-05	Y	0.01	0.00	2.13E-07	2.13E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.85E-08	N	0.01	0.01	4.85E-10	4.85E-10
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	6.20E-07	Y	0.10	0.10	6.20E-08	6.20E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.65E-08	N	0.10	0.05	2.65E-09	1.33E-09
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.10E-07	Y	0.10	0.10	3.10E-08	3.10E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.22E-06	Y	0.10	0.01	1.22E-07	1.22E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.75E-08	N	0.10	0.10	2.75E-09	2.75E-09
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	6.80E-07	Y	0.10	0.10	6.80E-08	6.80E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	3.00E-08	N	0.03	0.10	9.00E-10	3.00E-09
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.10E-07	Y	1.00	1.00	2.10E-07	2.10E-07
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.80E-07	Y	0.10	0.10	2.80E-08	2.80E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	3.05E-08	N	0.30	1.00	9.15E-09	3.05E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	2.55E-08	N	0.10	1.00	2.55E-09	2.55E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.15E-08	N	1.00	1.00	2.15E-08	2.15E-08
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Octachlorodibenzofuran	6.08E-06	Y	0.00	0.00	1.82E-09	6.08E-10
CFSB-213-SO-0-0.5	6/22/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.72E-04	Y	0.00	0.00	5.16E-08	1.72E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.50E-06	Y	0.01	0.01	1.50E-08	1.50E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	9.29E-06	Y	0.01	0.00	9.29E-08	9.29E-09
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.65E-08	N	0.01	0.01	1.65E-10	1.65E-10
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.10E-07	Y	0.10	0.10	3.10E-08	3.10E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.10E-08	N	0.10	0.05	2.10E-09	1.05E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.70E-07	Y	0.10	0.10	1.70E-08	1.70E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	4.50E-07	Y	0.10	0.01	4.50E-08	4.50E-09
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.75E-08	N	0.10	0.10	2.75E-09	2.75E-09
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.20E-07	Y	0.10	0.10	3.20E-08	3.20E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.40E-08	N	0.03	0.10	4.20E-10	1.40E-09
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.90E-08	N	1.00	1.00	1.90E-08	1.90E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.20E-07	Y	0.10	0.10	1.20E-08	1.20E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.70E-07	Y	0.30	1.00	5.10E-08	1.70E-07
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	9.50E-09	N	0.10	1.00	9.50E-10	9.50E-09
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	9.00E-08	Y	1.00	1.00	9.00E-08	9.00E-08
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	2.00E-06	Y	0.00	0.00	6.00E-10	2.00E-10
CFSB-231-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	7.50E-05	Y	0.00	0.00	2.25E-08	7.50E-09
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.16E-06	Y	0.01	0.01	4.16E-08	4.16E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.74E-05	Y	0.01	0.00	3.74E-07	3.74E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.95E-08	N	0.01	0.01	3.95E-10	3.95E-10
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.09E-06	Y	0.10	0.10	1.09E-07	1.09E-07
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	4.70E-07	Y	0.10	0.05	4.70E-08	2.35E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.70E-08	N	0.10	0.10	3.70E-09	3.70E-09
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.82E-06	Y	0.10	0.01	1.82E-07	1.82E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.20E-08	N	0.10	0.10	4.20E-09	4.20E-09
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.03E-06	Y	0.10	0.10	1.03E-07	1.03E-07
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	7.40E-07	Y	0.03	0.10	2.22E-08	7.40E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	5.50E-08	N	1.00	1.00	5.50E-08	5.50E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.80E-07	Y	0.10	0.10	2.80E-08	2.80E-08
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	5.00E-07	Y	0.30	1.00	1.50E-07	5.00E-07
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.21E-06	Y	0.10	1.00	1.21E-07	1.21E-06
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.10E-07	Y	1.00	1.00	2.10E-07	2.10E-07
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	7.02E-06	Y	0.00	0.00	2.11E-09	7.02E-10
CFSB-231-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.99E-04	Y	0.00	0.00	8.97E-08	2.99E-08
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	8.50E-09	N	0.01	0.01	8.50E-11	8.50E-11
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.93E-06	Y	0.01	0.00	1.93E-08	1.93E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.05E-08	N	0.01	0.01	1.05E-10	1.05E-10
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	8.80E-08	Y	0.10	0.10	8.80E-09	8.80E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.05E-08	N	0.10	0.05	1.05E-09	5.25E-10
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-08	N	0.10	0.10	1.10E-09	1.10E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	9.50E-09	N	0.10	0.01	9.50E-10	9.50E-11
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.25E-08	N	0.10	0.10	1.25E-09	1.25E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.10E-08	Y	0.10	0.10	8.10E-09	8.10E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	8.00E-09	N	0.03	0.10	2.40E-10	8.00E-10
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	5.10E-08	Y	1.00	1.00	5.10E-08	5.10E-08
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.40E-08	Y	0.10	0.10	3.40E-09	3.40E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	5.60E-08	Y	0.30	1.00	1.68E-08	5.60E-08
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	4.20E-09	N	0.10	1.00	4.20E-10	4.20E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	6.00E-09	N	1.00	1.00	6.00E-09	6.00E-09
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	5.00E-09	N	0.00	0.00	1.50E-12	5.00E-13
CFSB-232-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.48E-05	Y	0.00	0.00	4.44E-09	1.48E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.10E-07	Y	0.01	0.01	5.10E-09	5.10E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.05E-06	Y	0.01	0.00	4.05E-08	4.05E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.35E-08	N	0.01	0.01	1.35E-10	1.35E-10

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.95E-08	N	0.10	0.10	1.95E-09	1.95E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.05	1.50E-09	7.50E-10
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.85E-08	N	0.10	0.10	1.85E-09	1.85E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.40E-08	N	0.10	0.01	1.40E-09	1.40E-10
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.10E-08	N	0.10	0.10	2.10E-09	2.10E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.10E-07	Y	0.10	0.10	2.10E-08	2.10E-08
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.10E-08	N	0.03	0.10	3.30E-10	1.10E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.30E-07	Y	1.00	1.00	1.30E-07	1.30E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.20E-08	Y	0.10	0.10	4.20E-09	4.20E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.10E-07	Y	0.30	1.00	3.30E-08	1.10E-07
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	6.00E-09	N	0.10	1.00	6.00E-10	6.00E-09
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	5.10E-08	Y	1.00	1.00	5.10E-08	5.10E-08
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	6.50E-09	N	0.00	0.00	1.95E-12	6.50E-13
CFSB-232-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	3.13E-05	Y	0.00	0.00	9.39E-09	3.13E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	7.00E-07	Y	0.01	0.01	7.00E-09	7.00E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.74E-06	Y	0.01	0.00	3.74E-08	3.74E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.40E-08	N	0.01	0.01	1.40E-10	1.40E-10
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.30E-07	Y	0.10	0.10	1.30E-08	1.30E-08
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.45E-08	N	0.10	0.05	1.45E-09	7.25E-10
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.10E-07	Y	0.10	0.10	1.10E-08	1.10E-08
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.90E-07	Y	0.10	0.01	3.90E-08	3.90E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.65E-08	N	0.10	0.10	1.65E-09	1.65E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	5.70E-07	Y	0.10	0.10	5.70E-08	5.70E-08
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	9.00E-09	N	0.03	0.10	2.70E-10	9.00E-10
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.50E-07	Y	1.00	1.00	1.50E-07	1.50E-07
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	9.30E-08	Y	0.10	0.10	9.30E-09	9.30E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	9.10E-08	Y	0.30	1.00	2.73E-08	9.10E-08
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	7.00E-09	N	0.10	1.00	7.00E-10	7.00E-09
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	7.90E-08	Y	1.00	1.00	7.90E-08	7.90E-08
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	1.99E-06	Y	0.00	0.00	5.97E-10	1.99E-10
CFSB-233-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	2.63E-05	Y	0.00	0.00	7.89E-09	2.63E-09
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.76E-06	Y	0.01	0.01	3.76E-08	3.76E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.11E-05	Y	0.01	0.00	2.11E-07	2.11E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.20E-08	N	0.01	0.01	4.20E-10	4.20E-10
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	5.90E-07	Y	0.10	0.10	5.90E-08	5.90E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.05E-08	N	0.10	0.05	3.05E-09	1.53E-09
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.70E-07	Y	0.10	0.10	2.70E-08	2.70E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	9.40E-07	Y	0.10	0.01	9.40E-08	9.40E-09
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.40E-08	N	0.10	0.10	4.40E-09	4.40E-09
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.00E-07	Y	0.10	0.10	8.00E-08	8.00E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.60E-08	N	0.03	0.10	7.80E-10	2.60E-09
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.20E-07	Y	1.00	1.00	2.20E-07	2.20E-07
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.60E-07	Y	0.10	0.10	1.60E-08	1.60E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.60E-07	Y	0.30	1.00	7.80E-08	2.60E-07
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	9.60E-07	Y	0.10	1.00	9.60E-08	9.60E-07
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	9.60E-08	Y	1.00	1.00	9.60E-08	9.60E-08
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	9.42E-06	Y	0.00	0.00	2.83E-09	9.42E-10
CFSB-233-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.66E-04	Y	0.00	0.00	4.98E-08	1.66E-08
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.01E-05	Y	0.01	0.01	1.01E-07	1.01E-07

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.14E-04	Y	0.01	0.00	1.14E-06	1.14E-07
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	7.10E-07	Y	0.01	0.01	7.10E-09	7.10E-09
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.39E-06	Y	0.10	0.10	1.39E-07	1.39E-07
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.11E-06	Y	0.10	0.05	1.11E-07	5.55E-08
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	6.20E-07	Y	0.10	0.10	6.20E-08	6.20E-08
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	4.16E-06	Y	0.10	0.01	4.16E-07	4.16E-08
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	6.50E-08	N	0.10	0.10	6.50E-09	6.50E-09
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.42E-06	Y	0.10	0.10	2.42E-07	2.42E-07
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	5.40E-07	Y	0.03	0.10	1.62E-08	5.40E-08
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	5.40E-07	Y	1.00	1.00	5.40E-07	5.40E-07
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.90E-07	Y	0.10	0.10	4.90E-08	4.90E-08
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	4.90E-07	Y	0.30	1.00	1.47E-07	4.90E-07
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.05E-06	Y	0.10	1.00	1.05E-07	1.05E-06
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.50E-07	Y	1.00	1.00	1.50E-07	1.50E-07
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	1.99E-05	Y	0.00	0.00	5.97E-09	1.99E-09
CFSB-234-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	9.03E-04	Y	0.00	0.00	2.71E-07	9.03E-08
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.06E-05	Y	0.01	0.01	2.06E-07	2.06E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.81E-04	Y	0.01	0.00	2.81E-06	2.81E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.14E-06	Y	0.01	0.01	1.14E-08	1.14E-08
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.57E-06	Y	0.10	0.10	2.57E-07	2.57E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.36E-06	Y	0.10	0.05	2.36E-07	1.18E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.34E-06	Y	0.10	0.10	1.34E-07	1.34E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.17E-05	Y	0.10	0.01	1.17E-06	1.17E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.20E-07	N	0.10	0.10	1.20E-08	1.20E-08
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	6.11E-06	Y	0.10	0.10	6.11E-07	6.11E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	9.60E-07	Y	0.03	0.10	2.88E-08	9.60E-08
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.20E-06	Y	1.00	1.00	1.20E-06	1.20E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	8.80E-07	Y	0.10	0.10	8.80E-08	8.80E-08
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	8.50E-07	Y	0.30	1.00	2.55E-07	8.50E-07
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.30E-06	Y	0.10	1.00	1.30E-07	1.30E-06
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.00E-08	N	1.00	1.00	1.00E-08	1.00E-08
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	3.41E-05	Y	0.00	0.00	1.02E-08	3.41E-09
CFSB-234-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.21E-03	Y	0.00	0.00	6.63E-07	2.21E-07
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.40E-06	Y	0.01	0.01	2.40E-08	2.40E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.88E-05	Y	0.01	0.00	1.88E-07	1.88E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.35E-08	N	0.01	0.01	3.35E-10	3.35E-10
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	5.70E-07	Y	0.10	0.10	5.70E-08	5.70E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.50E-08	N	0.10	0.05	2.50E-09	1.25E-09
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.90E-07	Y	0.10	0.10	2.90E-08	2.90E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	9.40E-07	Y	0.10	0.01	9.40E-08	9.40E-09
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.75E-08	N	0.10	0.10	2.75E-09	2.75E-09
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.40E-07	Y	0.10	0.10	9.40E-08	9.40E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.35E-08	N	0.03	0.10	4.05E-10	1.35E-09
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.40E-07	Y	1.00	1.00	2.40E-07	2.40E-07
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.30E-07	Y	0.10	0.10	2.30E-08	2.30E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.70E-07	Y	0.30	1.00	8.10E-08	2.70E-07
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	9.10E-07	Y	0.10	1.00	9.10E-08	9.10E-07
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	7.20E-08	Y	1.00	1.00	7.20E-08	7.20E-08
CFSB-235-SO-0.5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	4.21E-06	Y	0.00	0.00	1.26E-09	4.21E-10

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-235-SO-0-5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.29E-04	Y	0.00	0.00	3.87E-08	1.29E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.05E-06	Y	0.01	0.01	4.05E-08	4.05E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.56E-05	Y	0.01	0.00	3.56E-07	3.56E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.55E-08	N	0.01	0.01	4.55E-10	4.55E-10
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.00E-06	Y	0.10	0.10	1.00E-07	1.00E-07
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	7.50E-07	Y	0.10	0.05	7.50E-08	3.75E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	5.10E-07	Y	0.10	0.10	5.10E-08	5.10E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.75E-06	Y	0.10	0.01	1.75E-07	1.75E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.20E-08	N	0.10	0.10	4.20E-09	4.20E-09
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.36E-06	Y	0.10	0.10	1.36E-07	1.36E-07
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	6.10E-07	Y	0.03	0.10	1.83E-08	6.10E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.30E-07	Y	1.00	1.00	3.30E-07	3.30E-07
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.20E-07	Y	0.10	0.10	3.20E-08	3.20E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	5.40E-07	Y	0.30	1.00	1.62E-07	5.40E-07
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.21E-06	Y	0.10	1.00	1.21E-07	1.21E-06
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	8.10E-08	Y	1.00	1.00	8.10E-08	8.10E-08
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	6.71E-06	Y	0.00	0.00	2.01E-09	6.71E-10
CFSB-235-SO-0-0-5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.47E-04	Y	0.00	0.00	7.41E-08	2.47E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.45E-05	Y	0.01	0.01	3.45E-07	3.45E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.46E-04	Y	0.01	0.00	2.46E-06	2.46E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.11E-06	Y	0.01	0.01	2.11E-08	2.11E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.14E-06	Y	0.10	0.10	3.14E-07	3.14E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.84E-06	Y	0.10	0.05	1.84E-07	9.20E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.44E-06	Y	0.10	0.10	1.44E-07	1.44E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	7.80E-06	Y	0.10	0.01	7.80E-07	7.80E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.45E-07	N	0.10	0.10	1.45E-08	1.45E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	4.81E-06	Y	0.10	0.10	4.81E-07	4.81E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	6.40E-07	Y	0.03	0.10	1.92E-08	6.40E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	7.30E-07	Y	1.00	1.00	7.30E-07	7.30E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.07E-06	Y	0.10	0.10	1.07E-07	1.07E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	7.10E-07	Y	0.30	1.00	2.13E-07	7.10E-07
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	4.90E-08	N	0.10	1.00	4.90E-09	4.90E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.90E-08	N	1.00	1.00	4.90E-08	4.90E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzofuran	1.02E-04	Y	0.00	0.00	3.06E-08	1.02E-08
CFSB-236-SO-0-5-2	4/28/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	2.85E-03	Y	0.00	0.00	8.55E-07	2.85E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	6.97E-05	Y	0.01	0.01	6.97E-07	6.97E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	6.04E-04	Y	0.01	0.00	6.04E-06	6.04E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.13E-06	Y	0.01	0.01	4.13E-08	4.13E-08
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	5.47E-06	Y	0.10	0.10	5.47E-07	5.47E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	4.07E-06	Y	0.10	0.05	4.07E-07	2.04E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.85E-06	Y	0.10	0.10	2.85E-07	2.85E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.92E-05	Y	0.10	0.01	1.92E-06	1.92E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.45E-07	N	0.10	0.10	2.45E-08	2.45E-08
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.54E-06	Y	0.10	0.10	9.54E-07	9.54E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.17E-06	Y	0.03	0.10	3.51E-08	1.17E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.53E-06	Y	1.00	1.00	1.53E-06	1.53E-06
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.58E-06	Y	0.10	0.10	2.58E-07	2.58E-07
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.22E-06	Y	0.30	1.00	3.66E-07	1.22E-06
CFSB-236-SO-0-0-5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	6.00E-08	N	0.10	1.00	6.00E-09	6.00E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	3.10E-07	Y	1.00	1.00	3.10E-07	3.10E-07
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzofuran	1.90E-04	Y	0.00	0.00	5.70E-08	1.90E-08
CFSB-236-SO-0-0.5	4/28/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	6.76E-03	Y	0.00	0.00	2.03E-06	6.76E-07
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	8.83E-06	Y	0.01	0.00	8.83E-08	8.83E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.30E-08	N	0.01	0.01	2.30E-10	2.30E-10
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.50E-08	N	0.10	0.10	3.50E-09	3.50E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.20E-08	N	0.10	0.05	1.20E-09	6.00E-10
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.25E-08	N	0.10	0.10	3.25E-09	3.25E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.10E-08	N	0.10	0.01	1.10E-09	1.10E-10
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.10E-08	N	0.10	0.10	4.10E-09	4.10E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.05E-08	N	0.10	0.10	1.05E-09	1.05E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	3.05E-08	N	0.03	0.10	9.15E-10	3.05E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	8.70E-08	Y	1.00	1.00	8.70E-08	8.70E-08
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.35E-08	N	0.10	0.10	3.35E-09	3.35E-09
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.34E-06	Y	0.30	1.00	4.02E-07	1.34E-06
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	1.54E-06	Y	0.10	1.00	1.54E-07	1.54E-06
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.85E-08	N	1.00	1.00	1.85E-08	1.85E-08
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	1.15E-08	N	0.00	0.00	3.45E-12	1.15E-12
CFSB-288-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	8.32E-05	Y	0.00	0.00	2.50E-08	8.32E-09
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	8.06E-06	Y	0.01	0.01	8.06E-08	8.06E-08
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.87E-05	Y	0.01	0.00	2.87E-07	2.87E-08
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	6.50E-08	N	0.01	0.01	6.50E-10	6.50E-10
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.75E-06	Y	0.10	0.10	4.75E-07	4.75E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.90E-08	N	0.10	0.05	2.90E-09	1.45E-09
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.00E-06	Y	0.10	0.10	4.00E-07	4.00E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.58E-06	Y	0.10	0.01	1.58E-07	1.58E-08
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.40E-07	N	0.10	0.10	1.40E-08	1.40E-08
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.28E-06	Y	0.10	0.10	1.28E-07	1.28E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.84E-06	Y	0.03	0.10	8.52E-08	2.84E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.50E-07	Y	1.00	1.00	2.50E-07	2.50E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.24E-06	Y	0.10	0.10	1.24E-07	1.24E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	3.65E-06	Y	0.30	1.00	1.10E-06	3.65E-06
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	6.15E-06	Y	0.10	1.00	6.15E-07	6.15E-06
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.50E-07	Y	1.00	1.00	1.50E-07	1.50E-07
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	1.05E-05	Y	0.00	0.00	3.15E-09	1.05E-09
CFSB-288-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	3.19E-04	Y	0.00	0.00	9.57E-08	3.19E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.36E-06	Y	0.01	0.01	1.36E-08	1.36E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.11E-06	Y	0.01	0.00	4.11E-08	4.11E-09
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.30E-08	N	0.01	0.01	3.30E-10	3.30E-10
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	6.40E-07	Y	0.10	0.10	6.40E-08	6.40E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.05	1.50E-09	7.50E-10
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.40E-07	Y	0.10	0.10	4.40E-08	4.40E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.40E-08	N	0.10	0.01	1.40E-09	1.40E-10
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	7.00E-08	N	0.10	0.10	7.00E-09	7.00E-09
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.00E-07	Y	0.10	0.10	3.00E-08	3.00E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.35E-08	N	0.03	0.10	7.05E-10	2.35E-09
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.75E-08	N	1.00	1.00	2.75E-08	2.75E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	6.00E-08	N	0.10	0.10	6.00E-09	6.00E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	3.70E-07	Y	0.30	1.00	1.11E-07	3.70E-07
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	9.60E-07	Y	0.10	1.00	9.60E-08	9.60E-07
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.80E-08	N	1.00	1.00	1.80E-08	1.80E-08
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	3.44E-06	Y	0.00	0.00	1.03E-09	3.44E-10
CFSB-293-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	3.18E-05	Y	0.00	0.00	9.54E-09	3.18E-09
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.07E-06	Y	0.01	0.01	2.07E-08	2.07E-08
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	7.22E-06	Y	0.01	0.00	7.22E-08	7.22E-09
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.80E-08	N	0.01	0.01	3.80E-10	3.80E-10
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	6.70E-07	Y	0.10	0.10	6.70E-08	6.70E-08
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.90E-08	N	0.10	0.05	1.90E-09	9.50E-10
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.00E-07	Y	0.10	0.10	4.00E-08	4.00E-08
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	4.50E-07	Y	0.10	0.01	4.50E-08	4.50E-09
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	8.00E-08	N	0.10	0.10	8.00E-09	8.00E-09
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	4.10E-07	Y	0.10	0.10	4.10E-08	4.10E-08
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.95E-08	N	0.03	0.10	8.85E-10	2.95E-09
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.40E-08	N	1.00	1.00	3.40E-08	3.40E-08
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	6.50E-08	N	0.10	0.10	6.50E-09	6.50E-09
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	4.60E-07	Y	0.30	1.00	1.38E-07	4.60E-07
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.12E-06	Y	0.10	1.00	1.12E-07	1.12E-06
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.10E-08	N	1.00	1.00	2.10E-08	2.10E-08
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	5.29E-06	Y	0.00	0.00	1.59E-09	5.29E-10
CFSB-293-SO-0.0-5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	5.78E-05	Y	0.00	0.00	1.73E-08	5.78E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.15E-08	N	0.01	0.01	2.15E-10	2.15E-10
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.43E-06	Y	0.01	0.00	1.43E-08	1.43E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.55E-08	N	0.01	0.01	2.55E-10	2.55E-10
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.80E-08	N	0.10	0.10	4.80E-09	4.80E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.35E-08	N	0.10	0.05	1.35E-09	6.75E-10
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	4.90E-07	Y	0.10	0.10	4.90E-08	4.90E-08
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.25E-08	N	0.10	0.01	1.25E-09	1.25E-10
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.25E-08	N	0.10	0.10	1.25E-09	1.25E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.85E-08	N	0.03	0.10	5.55E-10	1.85E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.80E-08	N	1.00	1.00	1.80E-08	1.80E-08
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.60E-08	N	0.10	0.10	4.60E-09	4.60E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.10E-07	Y	0.30	1.00	3.30E-08	1.10E-07
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	9.50E-09	N	0.10	1.00	9.50E-10	9.50E-09
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.30E-08	N	1.00	1.00	2.30E-08	2.30E-08
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	2.55E-06	Y	0.00	0.00	7.65E-10	2.55E-10
CFSB-294-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.14E-05	Y	0.00	0.00	3.42E-09	1.14E-09
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.50E-08	N	0.01	0.01	2.50E-10	2.50E-10
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.42E-06	Y	0.01	0.00	1.42E-08	1.42E-09
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.00E-08	N	0.01	0.01	3.00E-10	3.00E-10
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.45E-08	N	0.10	0.10	4.45E-09	4.45E-09
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.45E-08	N	0.10	0.05	1.45E-09	7.25E-10
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.80E-07	Y	0.10	0.10	1.80E-08	1.80E-08
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.30E-08	N	0.10	0.01	1.30E-09	1.30E-10
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.30E-08	N	0.10	0.10	1.30E-09	1.30E-09
CFSB-294-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.70E-08	N	0.03	0.10	5.10E-10	1.70E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	4.20E-08	Y	1.00	1.00	4.20E-08	4.20E-08
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.30E-08	N	0.10	0.10	4.30E-09	4.30E-09
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.70E-08	N	0.30	1.00	5.10E-09	1.70E-08
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.15E-08	N	0.10	1.00	1.15E-09	1.15E-08
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.75E-08	N	1.00	1.00	2.75E-08	2.75E-08
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	3.50E-08	N	0.00	0.00	1.05E-11	3.50E-12
CFSB-294-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.41E-05	Y	0.00	0.00	4.23E-09	1.41E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.85E-06	Y	0.01	0.01	5.85E-08	5.85E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.36E-05	Y	0.01	0.00	2.36E-07	2.36E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.55E-07	N	0.01	0.01	1.55E-09	1.55E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,4,7,8-Hexachlorodibenzofuran	9.50E-08	N	0.10	0.10	9.50E-09	9.50E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	5.50E-08	N	0.10	0.05	5.50E-09	2.75E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,6,7,8-Hexachlorodibenzofuran	8.00E-08	N	0.10	0.10	8.00E-09	8.00E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	9.30E-07	Y	0.10	0.01	9.30E-08	9.30E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,7,8,9-Hexachlorodibenzofuran	9.50E-08	N	0.10	0.10	9.50E-09	9.50E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	8.40E-07	Y	0.10	0.10	8.40E-08	8.40E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,7,8-Pentachlorodibenzofuran	4.20E-08	N	0.03	0.10	1.26E-09	4.20E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	5.50E-08	N	1.00	1.00	5.50E-08	5.50E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	2,3,4,6,7,8-Hexachlorodibenzofuran	9.00E-08	N	0.10	0.10	9.00E-09	9.00E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	2,3,4,7,8-Pentachlorodibenzofuran	4.30E-08	N	0.30	1.00	1.29E-08	4.30E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	2,3,7,8-Tetrachlorodibenzofuran	3.65E-08	N	0.10	1.00	3.65E-09	3.65E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	5.00E-08	N	1.00	1.00	5.00E-08	5.00E-08
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Octachlorodibenzofuran	2.59E-05	Y	0.00	0.00	7.77E-09	2.59E-09
CFSB-DUP25-SO	4/28/2018	0.00-0.50	FD	Octachlorodibenzo-P-Dioxin	1.67E-04	Y	0.00	0.00	5.01E-08	1.67E-08
Central Landfills Area										
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.13E-06	Y	0.01	0.01	5.13E-08	5.13E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	7.63E-05	Y	0.01	0.00	7.63E-07	7.63E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	6.50E-08	N	0.01	0.01	6.50E-10	6.50E-10
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.06E-06	Y	0.10	0.10	1.06E-07	1.06E-07
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.40E-08	N	0.10	0.05	3.40E-09	1.70E-09
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	6.40E-07	Y	0.10	0.10	6.40E-08	6.40E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.46E-06	Y	0.10	0.01	2.46E-07	2.46E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.35E-07	N	0.10	0.10	1.35E-08	1.35E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	7.00E-07	Y	0.10	0.10	7.00E-08	7.00E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	3.35E-08	N	0.03	0.10	1.01E-09	3.35E-09
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	4.50E-08	N	1.00	1.00	4.50E-08	4.50E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.10E-07	N	0.10	0.10	1.10E-08	1.10E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	3.00E-07	Y	0.30	1.00	9.00E-08	3.00E-07
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	6.90E-07	Y	0.10	1.00	6.90E-08	6.90E-07
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	6.00E-08	N	1.00	1.00	6.00E-08	6.00E-08
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	1.68E-05	Y	0.00	0.00	5.04E-09	1.68E-09
CFSB-289-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	8.91E-04	Y	0.00	0.00	2.67E-07	8.91E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.40E-08	N	0.01	0.01	2.40E-10	2.40E-10
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.38E-06	Y	0.01	0.00	1.38E-08	1.38E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.85E-08	N	0.01	0.01	2.85E-10	2.85E-10
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	6.00E-08	N	0.10	0.10	6.00E-09	6.00E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.05E-08	N	0.10	0.05	2.05E-09	1.03E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.80E-07	Y	0.10	0.10	1.80E-08	1.80E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.90E-08	N	0.10	0.01	1.90E-09	1.90E-10

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	7.00E-08	N	0.10	0.10	7.00E-09	7.00E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.85E-08	N	0.10	0.10	1.85E-09	1.85E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.55E-08	N	0.03	0.10	7.65E-10	2.55E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.75E-08	N	1.00	1.00	2.75E-08	2.75E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.55E-08	N	0.30	1.00	7.65E-09	2.55E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	2.35E-08	N	0.10	1.00	2.35E-09	2.35E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.00E-08	N	1.00	1.00	4.00E-08	4.00E-08
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	5.00E-08	N	0.00	0.00	1.50E-11	5.00E-12
CFSB-289-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	8.87E-06	Y	0.00	0.00	2.66E-09	8.87E-10
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.55E-08	N	0.01	0.01	2.55E-10	2.55E-10
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.54E-06	Y	0.01	0.00	4.54E-08	4.54E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.05E-08	N	0.01	0.01	3.05E-10	3.05E-10
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.80E-08	N	0.10	0.10	4.80E-09	4.80E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.65E-08	N	0.10	0.05	1.65E-09	8.25E-10
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.70E-07	Y	0.10	0.10	1.70E-08	1.70E-08
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.00E-07	Y	0.10	0.01	3.00E-08	3.00E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.10	1.50E-09	1.50E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.35E-08	N	0.03	0.10	7.05E-10	2.35E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	7.30E-08	Y	1.00	1.00	7.30E-08	7.30E-08
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.60E-08	N	0.10	0.10	4.60E-09	4.60E-09
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.10E-07	Y	0.30	1.00	3.30E-08	1.10E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	4.60E-07	Y	0.10	1.00	4.60E-08	4.60E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.70E-07	Y	1.00	1.00	2.70E-07	2.70E-07
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	3.70E-08	N	0.00	0.00	1.11E-11	3.70E-12
CFSB-290-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	3.95E-05	Y	0.00	0.00	1.19E-08	3.95E-09
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	5.37E-06	Y	0.01	0.01	5.37E-08	5.37E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.13E-05	Y	0.01	0.00	3.13E-07	3.13E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	5.50E-08	N	0.01	0.01	5.50E-10	5.50E-10
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.67E-06	Y	0.10	0.10	1.67E-07	1.67E-07
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.15E-08	N	0.10	0.05	3.15E-09	1.58E-09
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	7.80E-07	Y	0.10	0.10	7.80E-08	7.80E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.84E-06	Y	0.10	0.01	1.84E-07	1.84E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.50E-07	N	0.10	0.10	1.50E-08	1.50E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.14E-06	Y	0.10	0.10	1.14E-07	1.14E-07
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	3.95E-08	N	0.03	0.10	1.19E-09	3.95E-09
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.20E-07	Y	1.00	1.00	3.20E-07	3.20E-07
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	5.70E-07	Y	0.10	0.10	5.70E-08	5.70E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	9.50E-07	Y	0.30	1.00	2.85E-07	9.50E-07
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.78E-06	Y	0.10	1.00	1.78E-07	1.78E-06
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	5.00E-08	N	1.00	1.00	5.00E-08	5.00E-08
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	7.31E-06	Y	0.00	0.00	2.19E-09	7.31E-10
CFSB-290-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.77E-04	Y	0.00	0.00	8.31E-08	2.77E-08
Western Undeveloped Area										
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.05E-08	N	0.01	0.01	2.05E-10	2.05E-10
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.55E-08	N	0.01	0.00	1.55E-10	1.55E-11
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.45E-08	N	0.01	0.01	2.45E-10	2.45E-10
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.70E-08	N	0.10	0.10	4.70E-09	4.70E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.75E-08	N	0.10	0.05	1.75E-09	8.75E-10
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.30E-07	Y	0.10	0.10	2.30E-08	2.30E-08
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.60E-08	N	0.10	0.01	1.60E-09	1.60E-10
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	5.50E-08	N	0.10	0.10	5.50E-09	5.50E-09
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.70E-07	Y	0.10	0.10	3.70E-08	3.70E-08
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.65E-08	N	0.03	0.10	7.95E-10	2.65E-09
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.10E-07	Y	1.00	1.00	1.10E-07	1.10E-07
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	4.50E-08	N	0.10	0.10	4.50E-09	4.50E-09
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.10E-07	Y	0.30	1.00	3.30E-08	1.10E-07
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	2.00E-08	N	0.10	1.00	2.00E-09	2.00E-08
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.60E-07	Y	1.00	1.00	4.60E-07	4.60E-07
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	3.85E-08	N	0.00	0.00	1.16E-11	3.85E-12
CFSB-168-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.90E-08	N	0.00	0.00	5.70E-12	1.90E-12
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.03E-06	Y	0.01	0.01	2.03E-08	2.03E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5.89E-06	Y	0.01	0.00	5.89E-08	5.89E-09
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.00E-08	N	0.01	0.01	4.00E-10	4.00E-10
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	8.00E-07	Y	0.10	0.10	8.00E-08	8.00E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.07E-06	Y	0.10	0.05	1.07E-07	5.35E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	7.60E-07	Y	0.10	0.10	7.60E-08	7.60E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.11E-06	Y	0.10	0.01	1.11E-07	1.11E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.45E-08	N	0.10	0.10	4.45E-09	4.45E-09
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.29E-06	Y	0.10	0.10	1.29E-07	1.29E-07
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.75E-08	N	0.03	0.10	5.25E-10	1.75E-09
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.10E-07	Y	1.00	1.00	3.10E-07	3.10E-07
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	9.20E-07	Y	0.10	0.10	9.20E-08	9.20E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.80E-07	Y	0.30	1.00	8.40E-08	2.80E-07
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	7.50E-09	N	0.10	1.00	7.50E-10	7.50E-09
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	9.10E-08	Y	1.00	1.00	9.10E-08	9.10E-08
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	7.38E-06	Y	0.00	0.00	2.21E-09	7.38E-10
CFSB-168-SO-0.0-5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.93E-05	Y	0.00	0.00	8.79E-09	2.93E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	9.60E-07	Y	0.01	0.01	9.60E-09	9.60E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.96E-06	Y	0.01	0.00	1.96E-08	1.96E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.80E-08	N	0.01	0.01	2.80E-10	2.80E-10
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.30E-08	N	0.10	0.10	3.30E-09	3.30E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.60E-08	N	0.10	0.05	1.60E-09	8.00E-10
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.90E-07	Y	0.10	0.10	1.90E-08	1.90E-08
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.50E-08	N	0.10	0.01	1.50E-09	1.50E-10
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.90E-08	N	0.10	0.10	3.90E-09	3.90E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.45E-08	N	0.10	0.10	1.45E-09	1.45E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.40E-08	N	0.03	0.10	4.20E-10	1.40E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.80E-08	N	1.00	1.00	1.80E-08	1.80E-08
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.20E-08	N	0.10	0.10	3.20E-09	3.20E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.40E-08	N	0.30	1.00	4.20E-09	1.40E-08
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	8.00E-09	N	0.10	1.00	8.00E-10	8.00E-09
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.90E-08	N	1.00	1.00	1.90E-08	1.90E-08
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Octachlorodibenzofuran	2.78E-06	Y	0.00	0.00	8.34E-10	2.78E-10
CFSB-172-SO-0.5-2	9/26/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.82E-05	Y	0.00	0.00	5.46E-09	1.82E-09
CFSB-172-SO-0.0-5	9/26/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.05E-08	N	0.01	0.01	2.05E-10	2.05E-10
CFSB-172-SO-0.0-5	9/26/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.87E-06	Y	0.01	0.00	2.87E-08	2.87E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.45E-08	N	0.01	0.01	2.45E-10	2.45E-10
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.80E-08	N	0.10	0.10	3.80E-09	3.80E-09
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.80E-08	N	0.10	0.05	1.80E-09	9.00E-10
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.50E-08	N	0.10	0.10	3.50E-09	3.50E-09
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.65E-08	N	0.10	0.01	1.65E-09	1.65E-10
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.45E-08	N	0.10	0.10	4.45E-09	4.45E-09
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.60E-07	Y	0.10	0.10	2.60E-08	2.60E-08
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.80E-08	N	0.03	0.10	5.40E-10	1.80E-09
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	8.50E-08	Y	1.00	1.00	8.50E-08	8.50E-08
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.65E-08	N	0.10	0.10	3.65E-09	3.65E-09
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.80E-08	N	0.30	1.00	5.40E-09	1.80E-08
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	9.50E-09	N	0.10	1.00	9.50E-10	9.50E-09
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.25E-08	N	1.00	1.00	2.25E-08	2.25E-08
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Octachlorodibenzofuran	2.60E-08	N	0.00	0.00	7.80E-12	2.60E-12
CFSB-172-SO-0-0.5	9/26/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.69E-05	Y	0.00	0.00	5.07E-09	1.69E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	9.70E-07	Y	0.01	0.00	9.70E-09	9.70E-10
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.35E-08	N	0.01	0.01	2.35E-10	2.35E-10
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.55E-08	N	0.10	0.10	2.55E-09	2.55E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.10E-08	N	0.10	0.05	1.10E-09	5.50E-10
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.60E-07	Y	0.10	0.10	1.60E-08	1.60E-08
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.00E-08	N	0.10	0.01	1.00E-09	1.00E-10
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.00E-08	N	0.10	0.10	3.00E-09	3.00E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.00E-08	N	0.10	0.10	1.00E-09	1.00E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.20E-08	N	0.03	0.10	3.60E-10	1.20E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	4.50E-08	Y	1.00	1.00	4.50E-08	4.50E-08
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.45E-08	N	0.10	0.10	2.45E-09	2.45E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	6.90E-08	Y	0.30	1.00	2.07E-08	6.90E-08
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	6.00E-09	N	0.10	1.00	6.00E-10	6.00E-09
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.85E-08	N	1.00	1.00	1.85E-08	1.85E-08
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	2.30E-08	N	0.00	0.00	6.90E-12	2.30E-12
CFSB-196-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.11E-05	Y	0.00	0.00	3.33E-09	1.11E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.85E-08	N	0.01	0.01	1.85E-10	1.85E-10
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.80E-06	Y	0.01	0.00	3.80E-08	3.80E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.20E-08	N	0.01	0.01	2.20E-10	2.20E-10
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.15E-08	N	0.10	0.10	3.15E-09	3.15E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.25E-08	N	0.10	0.05	1.25E-09	6.25E-10
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.50E-07	Y	0.10	0.10	1.50E-08	1.50E-08
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.15E-08	N	0.10	0.01	1.15E-09	1.15E-10
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.70E-08	N	0.10	0.10	3.70E-09	3.70E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.20E-07	Y	0.10	0.10	3.20E-08	3.20E-08
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.20E-08	N	0.03	0.10	3.60E-10	1.20E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	6.80E-08	Y	1.00	1.00	6.80E-08	6.80E-08
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.05E-08	N	0.10	0.10	3.05E-09	3.05E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	7.30E-08	Y	0.30	1.00	2.19E-08	7.30E-08
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	6.50E-09	N	0.10	1.00	6.50E-10	6.50E-09
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.65E-08	N	1.00	1.00	1.65E-08	1.65E-08
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	1.55E-08	N	0.00	0.00	4.65E-12	1.55E-12
CFSB-196-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.39E-05	Y	0.00	0.00	7.17E-09	2.39E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.70E-08	N	0.01	0.01	1.70E-10	1.70E-10
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.10E-08	N	0.01	0.00	2.10E-10	2.10E-11
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.85E-08	N	0.10	0.10	2.85E-09	2.85E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.85E-08	N	0.10	0.05	2.85E-09	1.43E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.60E-08	N	0.10	0.10	2.60E-09	2.60E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.50E-08	N	0.10	0.01	2.50E-09	2.50E-10
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.65E-08	N	0.10	0.10	2.65E-09	2.65E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.30E-08	N	0.10	0.10	2.30E-09	2.30E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.95E-08	N	0.03	0.10	8.85E-10	2.95E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.50E-08	N	1.00	1.00	3.50E-08	3.50E-08
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.65E-08	N	0.10	0.10	2.65E-09	2.65E-09
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	3.00E-08	N	0.30	1.00	9.00E-09	3.00E-08
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	3.10E-08	N	0.10	1.00	3.10E-09	3.10E-08
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	3.40E-08	N	1.00	1.00	3.40E-08	3.40E-08
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzofuran	2.80E-08	N	0.00	0.00	8.40E-12	2.80E-12
CFSB-215-SO-0.5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	3.15E-08	N	0.00	0.00	9.45E-12	3.15E-12
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.35E-08	N	0.01	0.01	2.35E-10	2.35E-10
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.73E-06	Y	0.01	0.00	2.73E-08	2.73E-09
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Heptachlorodibenzofuran	2.70E-08	N	0.01	0.01	2.70E-10	2.70E-10
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.30E-07	Y	0.10	0.10	2.30E-08	2.30E-08
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.70E-08	N	0.10	0.05	2.70E-09	1.35E-09
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.90E-07	Y	0.10	0.10	1.90E-08	1.90E-08
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.35E-08	N	0.10	0.01	2.35E-09	2.35E-10
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.10E-08	N	0.10	0.10	3.10E-09	3.10E-09
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.15E-08	N	0.10	0.10	2.15E-09	2.15E-09
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.45E-08	N	0.03	0.10	7.35E-10	2.45E-09
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.70E-07	Y	1.00	1.00	1.70E-07	1.70E-07
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.60E-07	Y	0.10	0.10	1.60E-08	1.60E-08
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.50E-08	N	0.30	1.00	7.50E-09	2.50E-08
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	3.40E-08	N	0.10	1.00	3.40E-09	3.40E-08
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.65E-08	N	1.00	1.00	2.65E-08	2.65E-08
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	Octachlorodibenzofuran	2.50E-08	N	0.00	0.00	7.50E-12	2.50E-12
CFSB-215-SO-0.0-5	6/21/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	1.14E-05	Y	0.00	0.00	3.42E-09	1.14E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.25E-08	N	0.01	0.01	2.25E-10	2.25E-10
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.75E-08	N	0.01	0.00	3.75E-10	3.75E-11
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.60E-08	N	0.01	0.01	2.60E-10	2.60E-10
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.75E-08	N	0.10	0.10	2.75E-09	2.75E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.85E-08	N	0.10	0.05	3.85E-09	1.93E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.50E-08	N	0.10	0.10	2.50E-09	2.50E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.40E-08	N	0.10	0.01	3.40E-09	3.40E-10
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.60E-08	N	0.10	0.10	2.60E-09	2.60E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.15E-08	N	0.10	0.10	3.15E-09	3.15E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	5.00E-08	N	0.03	0.10	1.50E-09	5.00E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	7.00E-08	N	1.00	1.00	7.00E-08	7.00E-08
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.60E-08	N	0.10	0.10	2.60E-09	2.60E-09
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	5.50E-08	N	0.30	1.00	1.65E-08	5.50E-08
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	4.35E-08	N	0.10	1.00	4.35E-09	4.35E-08
CFSB-216-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.84E-06	Y	1.00	1.00	1.84E-06	1.84E-06

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-216-SO-0-5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzofuran	4.15E-08	N	0.00	0.00	1.25E-11	4.15E-12
CFSB-216-SO-0-5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	6.00E-08	N	0.00	0.00	1.80E-11	6.00E-12
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.65E-08	N	0.01	0.01	2.65E-10	2.65E-10
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.51E-06	Y	0.01	0.00	4.51E-08	4.51E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.00E-08	N	0.01	0.01	3.00E-10	3.00E-10
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.20E-08	N	0.10	0.10	4.20E-09	4.20E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.75E-08	N	0.10	0.05	3.75E-09	1.88E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.85E-08	N	0.10	0.10	3.85E-09	3.85E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.30E-08	N	0.10	0.01	3.30E-09	3.30E-10
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.95E-08	N	0.10	0.10	3.95E-09	3.95E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	3.05E-08	N	0.10	0.10	3.05E-09	3.05E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	4.30E-08	N	0.03	0.10	1.29E-09	4.30E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	7.50E-08	N	1.00	1.00	7.50E-08	7.50E-08
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.95E-08	N	0.10	0.10	3.95E-09	3.95E-09
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	4.40E-08	N	0.30	1.00	1.32E-08	4.40E-08
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	5.00E-08	N	0.10	1.00	5.00E-09	5.00E-08
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	4.70E-08	N	1.00	1.00	4.70E-08	4.70E-08
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	Octachlorodibenzofuran	1.22E-06	Y	0.00	0.00	3.66E-10	1.22E-10
CFSB-216-SO-0-0-5	6/21/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.33E-05	Y	0.00	0.00	6.99E-09	2.33E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.00E-08	N	0.01	0.01	2.00E-10	2.00E-10
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.74E-06	Y	0.01	0.00	1.74E-08	1.74E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.30E-08	N	0.01	0.01	2.30E-10	2.30E-10
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.55E-08	N	0.10	0.10	3.55E-09	3.55E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.40E-08	N	0.10	0.05	3.40E-09	1.70E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.25E-08	N	0.10	0.10	3.25E-09	3.25E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.95E-08	N	0.10	0.01	2.95E-09	2.95E-10
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.35E-08	N	0.10	0.10	3.35E-09	3.35E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.75E-08	N	0.10	0.10	2.75E-09	2.75E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	3.45E-08	N	0.03	0.10	1.04E-09	3.45E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	4.45E-08	N	1.00	1.00	4.45E-08	4.45E-08
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.30E-08	N	0.10	0.10	3.30E-09	3.30E-09
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	3.50E-08	N	0.30	1.00	1.05E-08	3.50E-08
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	4.15E-08	N	0.10	1.00	4.15E-09	4.15E-08
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	3.65E-08	N	1.00	1.00	3.65E-08	3.65E-08
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzofuran	3.05E-08	N	0.00	0.00	9.15E-12	3.05E-12
CFSB-217-SO-0-5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	9.93E-06	Y	0.00	0.00	2.98E-09	9.93E-10
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.70E-08	N	0.01	0.01	1.70E-10	1.70E-10
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.35E-08	N	0.01	0.00	2.35E-10	2.35E-11
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	3.50E-08	N	0.10	0.10	3.50E-09	3.50E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.55E-08	N	0.10	0.05	3.55E-09	1.78E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.20E-08	N	0.10	0.10	3.20E-09	3.20E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.10E-08	N	0.10	0.01	3.10E-09	3.10E-10
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.30E-08	N	0.10	0.10	3.30E-09	3.30E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.85E-08	N	0.10	0.10	2.85E-09	2.85E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	2.75E-08	N	0.03	0.10	8.25E-10	2.75E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.80E-08	N	1.00	1.00	3.80E-08	3.80E-08
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.25E-08	N	0.10	0.10	3.25E-09	3.25E-09
CFSB-217-SO-0-0-5	6/21/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	2.80E-08	N	0.30	1.00	8.40E-09	2.80E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	2.80E-08	N	0.10	1.00	2.80E-09	2.80E-08
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.40E-08	N	1.00	1.00	2.40E-08	2.40E-08
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	Octachlorodibenzofuran	2.70E-08	N	0.00	0.00	8.10E-12	2.70E-12
CFSB-217-SO-0-0.5	6/21/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.60E-08	N	0.00	0.00	7.80E-12	2.60E-12
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.75E-08	N	0.01	0.01	1.75E-10	1.75E-10
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	3.45E-06	Y	0.01	0.00	3.45E-08	3.45E-09
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	1.20E-07	Y	0.10	0.10	1.20E-08	1.20E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.70E-08	N	0.10	0.05	2.70E-09	1.35E-09
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	9.70E-08	Y	0.10	0.10	9.70E-09	9.70E-09
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.35E-08	N	0.10	0.01	2.35E-09	2.35E-10
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.15E-08	N	0.10	0.10	2.15E-09	2.15E-09
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.20E-08	N	0.10	0.10	2.20E-09	2.20E-09
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	2.00E-08	N	0.03	0.10	6.00E-10	2.00E-09
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	3.25E-08	N	1.00	1.00	3.25E-08	3.25E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.00E-07	Y	0.10	0.10	1.00E-08	1.00E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	2.05E-08	N	0.30	1.00	6.15E-09	2.05E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	3.40E-08	N	0.10	1.00	3.40E-09	3.40E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.95E-08	N	1.00	1.00	2.95E-08	2.95E-08
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzofuran	2.96E-06	Y	0.00	0.00	8.88E-10	2.96E-10
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.97E-05	Y	0.00	0.00	5.91E-09	1.97E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.65E-08	N	0.01	0.01	1.65E-10	1.65E-10
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.75E-08	N	0.01	0.00	1.75E-10	1.75E-11
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Heptachlorodibenzofuran	1.90E-08	N	0.01	0.01	1.90E-10	1.90E-10
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	7.50E-08	Y	0.10	0.10	7.50E-09	7.50E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	2.05E-08	N	0.10	0.05	2.05E-09	1.03E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.55E-08	N	0.10	0.10	1.55E-09	1.55E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.75E-08	N	0.10	0.01	1.75E-09	1.75E-10
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	1.60E-08	N	0.10	0.10	1.60E-09	1.60E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	1.65E-08	N	0.10	0.10	1.65E-09	1.65E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.85E-08	N	0.03	0.10	5.55E-10	1.85E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2.45E-08	N	1.00	1.00	2.45E-08	2.45E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	1.55E-08	N	0.10	0.10	1.55E-09	1.55E-09
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.90E-08	N	0.30	1.00	5.70E-09	1.90E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	1.80E-08	N	0.10	1.00	1.80E-09	1.80E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.05E-08	N	1.00	1.00	2.05E-08	2.05E-08
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Octachlorodibenzofuran	1.60E-08	N	0.00	0.00	4.80E-12	1.60E-12
CFSB-218-SO-0-0.5	6/21/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	3.74E-06	Y	0.00	0.00	1.12E-09	3.74E-10
CFSB-218-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.95E-08	N	0.01	0.01	2.95E-10	2.95E-10
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.65E-08	N	0.01	0.00	2.65E-10	2.65E-11
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Heptachlorodibenzofuran	3.40E-08	N	0.01	0.01	3.40E-10	3.40E-10
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.50E-08	N	0.10	0.10	2.50E-09	2.50E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.35E-08	N	0.10	0.05	3.35E-09	1.68E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.30E-08	N	0.10	0.10	2.30E-09	2.30E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.95E-08	N	0.10	0.01	2.95E-09	2.95E-10
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.35E-08	N	0.10	0.10	2.35E-09	2.35E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.70E-08	N	0.10	0.10	2.70E-09	2.70E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	4.70E-08	N	0.03	0.10	1.41E-09	4.70E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	6.50E-08	N	1.00	1.00	6.50E-08	6.50E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.35E-08	N	0.10	0.10	2.35E-09	2.35E-09
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	4.80E-08	N	0.30	1.00	1.44E-08	4.80E-08
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	3.35E-08	N	0.10	1.00	3.35E-09	3.35E-08
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	3.95E-08	N	1.00	1.00	3.95E-08	3.95E-08
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzofuran	4.25E-08	N	0.00	0.00	1.28E-11	4.25E-12
CFSB-237-SO-0.5-2	6/21/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	4.75E-08	N	0.00	0.00	1.43E-11	4.75E-12
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	9.30E-07	Y	0.01	0.01	9.30E-09	9.30E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	6.36E-06	Y	0.01	0.00	6.36E-08	6.36E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.90E-08	N	0.01	0.01	2.90E-10	2.90E-10
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.50E-08	N	0.10	0.10	2.50E-09	2.50E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	3.45E-08	N	0.10	0.05	3.45E-09	1.73E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.30E-08	N	0.10	0.10	2.30E-09	2.30E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.00E-08	N	0.10	0.01	3.00E-09	3.00E-10
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	2.40E-08	N	0.10	0.10	2.40E-09	2.40E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.80E-08	N	0.10	0.10	2.80E-09	2.80E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	3.95E-08	N	0.03	0.10	1.19E-09	3.95E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	6.50E-08	N	1.00	1.00	6.50E-08	6.50E-08
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.35E-08	N	0.10	0.10	2.35E-09	2.35E-09
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	4.05E-08	N	0.30	1.00	1.22E-08	4.05E-08
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	3.25E-08	N	0.10	1.00	3.25E-09	3.25E-08
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2.95E-08	N	1.00	1.00	2.95E-08	2.95E-08
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Octachlorodibenzofuran	2.13E-06	Y	0.00	0.00	6.39E-10	2.13E-10
CFSB-237-SO-0-0.5	6/21/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	3.35E-05	Y	0.00	0.00	1.01E-08	3.35E-09
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.65E-08	N	0.01	0.01	1.65E-10	1.65E-10
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.50E-07	Y	0.01	0.00	4.50E-09	4.50E-10
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.00E-08	N	0.01	0.01	2.00E-10	2.00E-10
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.85E-08	N	0.10	0.10	2.85E-09	2.85E-09
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.15E-08	N	0.10	0.05	1.15E-09	5.75E-10
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.30E-07	Y	0.10	0.10	1.30E-08	1.30E-08
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.05E-08	N	0.10	0.01	1.05E-09	1.05E-10
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.35E-08	N	0.10	0.10	3.35E-09	3.35E-09
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.60E-07	Y	0.10	0.10	2.60E-08	2.60E-08
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.10E-08	N	0.03	0.10	3.30E-10	1.10E-09
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	8.50E-08	Y	1.00	1.00	8.50E-08	8.50E-08
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.75E-08	N	0.10	0.10	2.75E-09	2.75E-09
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.10E-08	N	0.30	1.00	3.30E-09	1.10E-08
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	5.50E-09	N	0.10	1.00	5.50E-10	5.50E-09
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.05E-08	N	1.00	1.00	1.05E-08	1.05E-08
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Octachlorodibenzofuran	1.35E-08	N	0.00	0.00	4.05E-12	1.35E-12
CFSB-238-SO-0.5-2	9/25/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	1.47E-05	Y	0.00	0.00	4.41E-09	1.47E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	8.60E-07	Y	0.01	0.01	8.60E-09	8.60E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.14E-06	Y	0.01	0.00	4.14E-08	4.14E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1.65E-08	N	0.01	0.01	1.65E-10	1.65E-10
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.55E-08	N	0.10	0.10	2.55E-09	2.55E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.30E-08	N	0.10	0.05	1.30E-09	6.50E-10
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	2.40E-07	Y	0.10	0.10	2.40E-08	2.40E-08
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	3.20E-07	Y	0.10	0.01	3.20E-08	3.20E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.00E-08	N	0.10	0.10	3.00E-09	3.00E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	4.00E-07	Y	0.10	0.10	4.00E-08	4.00E-08

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.15E-08	N	0.03	0.10	3.45E-10	1.15E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.50E-07	Y	1.00	1.00	1.50E-07	1.50E-07
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.45E-08	N	0.10	0.10	2.45E-09	2.45E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.15E-08	N	0.30	1.00	3.45E-09	1.15E-08
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	6.00E-09	N	0.10	1.00	6.00E-10	6.00E-09
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.10E-08	N	1.00	1.00	1.10E-08	1.10E-08
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Octachlorodibenzofuran	1.96E-06	Y	0.00	0.00	5.88E-10	1.96E-10
CFSB-238-SO-0-0.5	9/25/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.38E-05	Y	0.00	0.00	7.14E-09	2.38E-09
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.00E-08	N	0.01	0.01	2.00E-10	2.00E-10
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	1.15E-08	N	0.01	0.00	1.15E-10	1.15E-11
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.40E-08	N	0.01	0.01	2.40E-10	2.40E-10
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzofuran	2.80E-08	N	0.10	0.10	2.80E-09	2.80E-09
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.05E-08	N	0.10	0.05	1.05E-09	5.25E-10
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzofuran	1.90E-07	Y	0.10	0.10	1.90E-08	1.90E-08
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	1.00E-08	N	0.10	0.01	1.00E-09	1.00E-10
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzofuran	3.30E-08	N	0.10	0.10	3.30E-09	3.30E-09
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	9.50E-09	N	0.10	0.10	9.50E-10	9.50E-10
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzofuran	1.15E-08	N	0.03	0.10	3.45E-10	1.15E-09
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	4.60E-08	Y	1.00	1.00	4.60E-08	4.60E-08
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,6,7,8-Hexachlorodibenzofuran	2.70E-08	N	0.10	0.10	2.70E-09	2.70E-09
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,4,7,8-Pentachlorodibenzofuran	1.15E-08	N	0.30	1.00	3.45E-09	1.15E-08
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzofuran	6.00E-09	N	0.10	1.00	6.00E-10	6.00E-09
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.65E-08	N	1.00	1.00	1.65E-08	1.65E-08
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzofuran	1.90E-08	N	0.00	0.00	5.70E-12	1.90E-12
CFSB-239-SO-0.5-2	9/27/2018	0.50-2.00	N	Octachlorodibenzo-P-Dioxin	4.64E-06	Y	0.00	0.00	1.39E-09	4.64E-10
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.25E-08	N	0.01	0.01	2.25E-10	2.25E-10
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	4.16E-06	Y	0.01	0.00	4.16E-08	4.16E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.70E-08	N	0.01	0.01	2.70E-10	2.70E-10
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzofuran	4.05E-08	N	0.10	0.10	4.05E-09	4.05E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.55E-08	N	0.10	0.05	1.55E-09	7.75E-10
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzofuran	3.75E-08	N	0.10	0.10	3.75E-09	3.75E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.90E-07	Y	0.10	0.01	2.90E-08	2.90E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzofuran	4.80E-08	N	0.10	0.10	4.80E-09	4.80E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.80E-07	Y	0.10	0.10	2.80E-08	2.80E-08
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzofuran	1.55E-08	N	0.03	0.10	4.65E-10	1.55E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	8.80E-08	Y	1.00	1.00	8.80E-08	8.80E-08
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,6,7,8-Hexachlorodibenzofuran	3.90E-08	N	0.10	0.10	3.90E-09	3.90E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,4,7,8-Pentachlorodibenzofuran	1.55E-08	N	0.30	1.00	4.65E-09	1.55E-08
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzofuran	7.50E-09	N	0.10	1.00	7.50E-10	7.50E-09
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	6.80E-08	Y	1.00	1.00	6.80E-08	6.80E-08
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzofuran	2.55E-08	N	0.00	0.00	7.65E-12	2.55E-12
CFSB-239-SO-0-0.5	9/27/2018	0.00-0.50	N	Octachlorodibenzo-P-Dioxin	2.35E-05	Y	0.00	0.00	7.05E-09	2.35E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1.95E-08	N	0.01	0.01	1.95E-10	1.95E-10
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2.85E-06	Y	0.01	0.00	2.85E-08	2.85E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.35E-08	N	0.01	0.01	2.35E-10	2.35E-10
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,4,7,8-Hexachlorodibenzofuran	3.15E-08	N	0.10	0.10	3.15E-09	3.15E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	1.60E-08	N	0.10	0.05	1.60E-09	8.00E-10
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,6,7,8-Hexachlorodibenzofuran	2.30E-07	Y	0.10	0.10	2.30E-08	2.30E-08
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2.70E-07	Y	0.10	0.01	2.70E-08	2.70E-09

Table C-3
Toxic Equivalency Concentration Calculations
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Sample Date	Depth Interval (ft)	Sample Type	Constituent	Result Value (ug/L)	Detect (Y/N)	Mammalian TEF	Avian TEF	Mammalian TEC (1/2 MDL)	Avian TEC (1/2 MDL)
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,7,8,9-Hexachlorodibenzofuran	3.70E-08	N	0.10	0.10	3.70E-09	3.70E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2.60E-07	Y	0.10	0.10	2.60E-08	2.60E-08
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,7,8-Pentachlorodibenzofuran	1.45E-08	N	0.03	0.10	4.35E-10	1.45E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	1.10E-07	Y	1.00	1.00	1.10E-07	1.10E-07
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	2,3,4,6,7,8-Hexachlorodibenzofuran	3.05E-08	N	0.10	0.10	3.05E-09	3.05E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	2,3,4,7,8-Pentachlorodibenzofuran	9.40E-08	Y	0.30	1.00	2.82E-08	9.40E-08
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	2,3,7,8-Tetrachlorodibenzofuran	8.50E-09	N	0.10	1.00	8.50E-10	8.50E-09
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1.75E-08	N	1.00	1.00	1.75E-08	1.75E-08
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Octachlorodibenzofuran	1.85E-08	N	0.00	0.00	5.55E-12	1.85E-12
CFSB-DUP50-SO	9/27/2018	0.00-0.50	FD	Octachlorodibenzo-P-Dioxin	1.71E-05	Y	0.00	0.00	5.13E-09	1.71E-09

Notes:

1/2 MDL: Non-detected dioxin and furan results were substituted with one-half the method detection limit

FD: Field Duplicate

N: Primary (Normal) sample

TEC: Toxic Equivalency Concentration

TEF: Toxic Equivalency Factor



Appendix D Calculated Ecological Screening Values for Hardness- and pH-Dependent Constituents

Table D-1
Summary of Ecological Screening Values Adjusted for Hardness
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent Fraction			Cadmium				Chromium, Total		Copper	Fluoride		Lead				Nickel			Zinc		
			F		U		F	U	U	F	U	F		U		F	U		F	U	
Sample Name	Sample Date	Hardness (as CaCO ₃) (mg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)		Refined ESV (µg/L)	Refined ESV (µg/L)		Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)
CFSWP-014-SW	3/13/2017	200	---	---	0.28	1.37	---	152.0	21.61	---	3974	---	---	7.69	7.69	---	93.76	93.76	---	215.57	215.57
CFSWP-014-SW	6/11/2018	159	0.23	1.02	0.23	1.14	108.35	126.0	17.76	---	3228	4.14	4.14	5.74	5.74	76.99	77.22	77.22	175.00	177.48	177.48
CFSWP-014-SW	6/13/2017	176	0.25	1.10	0.25	1.24	117.75	136.9	19.37	3539	3539	4.62	4.62	6.53	6.53	83.90	84.15	84.15	190.73	193.44	193.44
CFSWP-014-SW	8/29/2016	164	---	---	0.24	1.17	---	129.2	18.24	---	3319	---	---	5.97	5.97	---	79.27	79.27	---	182.20	182.20
CFSWP-014-SW	10/10/2018	172	0.25	1.08	0.25	1.22	115.56	134.4	18.99	---	3466	4.51	4.51	6.35	6.35	82.28	82.53	82.53	187.05	189.71	189.71
CFSWP-014-SW	11/30/2016	196	---	---	0.28	1.35	---	149.5	21.24	---	3902	---	---	7.49	7.49	---	92.17	92.17	---	211.91	211.91
CFSWP-015-SW	3/13/2017	202	---	---	0.28	1.38	---	153.3	21.79	---	4010	---	---	7.79	7.79	---	94.56	94.56	---	217.39	217.39
CFSWP-015-SW	6/11/2018	163	0.24	1.04	0.24	1.17	110.58	128.6	18.14	---	3301	4.25	4.25	5.93	5.93	78.63	78.86	78.86	178.72	181.26	181.26
CFSWP-015-SW	6/13/2017	180	0.26	1.12	0.26	1.26	119.94	139.5	19.75	3612	3612	4.73	4.73	6.72	6.72	85.51	85.77	85.77	194.40	197.16	197.16
CFSWP-015-SW	8/29/2016	178	---	---	0.26	1.25	---	138.2	19.56	---	3575	---	---	6.63	6.63	---	84.96	84.96	---	195.30	195.30
CFSWP-015-SW	10/9/2018	180	0.26	1.12	0.26	1.26	119.94	139.5	19.75	---	3612	4.73	4.73	6.72	6.72	85.51	85.77	85.77	194.40	197.16	197.16
CFSWP-015-SW	11/30/2016	196	---	---	0.28	1.35	---	149.5	21.24	---	3902	---	---	7.49	7.49	---	92.17	92.17	---	211.91	211.91
CFSWP-015-SW	12/20/2016	208	---	---	0.29	1.42	---	157.0	22.34	---	4118	---	---	8.08	8.08	---	96.93	96.93	---	222.85	222.85
CFSWP-016-SW	3/13/2017	202	---	---	0.28	1.38	---	153.3	21.79	---	4010	---	---	7.79	7.79	---	94.56	94.56	---	217.39	217.39
CFSWP-016-SW	6/12/2017	180	0.26	1.12	0.26	1.26	119.94	139.5	19.75	3612	3612	4.73	4.73	6.72	6.72	85.51	85.77	85.77	194.40	197.16	197.16
CFSWP-016-SW	6/12/2018	167	0.24	1.06	0.24	1.19	112.80	131.2	18.52	---	3374	4.37	4.37	6.11	6.11	80.26	80.50	80.50	182.43	185.02	185.02
CFSWP-016-SW	8/29/2016	172	---	---	0.25	1.22	---	134.4	18.99	---	3466	---	---	6.35	6.35	---	82.53	82.53	---	189.71	189.71
CFSWP-016-SW	10/9/2018	188	0.27	1.15	0.27	1.31	124.29	144.5	20.49	---	3757	4.95	4.95	7.11	7.11	88.71	88.98	88.98	201.69	204.56	204.56
CFSWP-016-SW	11/30/2016	200	---	---	0.28	1.37	---	152.0	21.61	---	3974	---	---	7.69	7.69	---	93.76	93.76	---	215.57	215.57
CFSWP-025-SW	3/13/2017	204	---	---	0.29	1.40	---	154.5	21.98	---	4046	---	---	7.89	7.89	---	95.35	95.35	---	219.21	219.21
CFSWP-025-SW	6/12/2018	159	0.23	1.02	0.23	1.14	108.35	126.0	17.76	---	3228	4.14	4.14	5.74	5.74	76.99	77.22	77.22	175.00	177.48	177.48
CFSWP-025-SW	6/13/2017	176	0.25	1.10	0.25	1.24	117.75	136.9	19.37	3539	3539	4.62	4.62	6.53	6.53	83.90	84.15	84.15	190.73	193.44	193.44
CFSWP-025-SW	10/10/2018	180	0.26	1.12	0.26	1.26	119.94	139.5	19.75	---	3612	4.73	4.73	6.72	6.72	85.51	85.77	85.77	194.40	197.16	197.16
CFSWP-025-SW	12/20/2016	206	---	---	0.29	1.41	---	155.8	22.16	---	4082	---	---	7.98	7.98	---	96.14	96.14	---	221.03	221.03
CFSWP-044-SW	6/11/2018	159	0.23	1.02	0.23	1.14	108.35	126.0	17.76	---	3228	4.14	4.14	5.74	5.74	76.99	77.22	77.22	175.00	177.48	177.48
CFSWP-044-SW	10/10/2018	184	0.26	1.14	0.26	1.29	122.12	142.0	20.12	---	3685	4.84	4.84	6.91	6.91	87.12	87.38	87.38	198.05	200.86	200.86
CFSWP-045-SW	6/11/2018	163	0.24	1.04	0.24	1.17	110.58	128.6	18.14	---	3301	4.25	4.25	5.93	5.93	78.63	78.86	78.86	178.72	181.26	181.26
CFSWP-045-SW	10/9/2018	184	0.26	1.14	0.26	1.29	122.12	142.0	20.12	---	3685	4.84	4.84	6.91	6.91	87.12	87.38	87.38	198.05	200.86	200.86
CFSWP-009-SW	4/3/2017	170	---	---	0.25	1.21	---	133.1	18.81	---	3429	---	---	6.25	6.25	---	81.72	81.72	---	187.83	187.83
CFSWP-009-SW	6/7/2016	170	---	---	0.25	1.21	---	133.1	18.81	---	3429	---	---	6.25	6.25	---	81.72	81.72	---	187.83	187.83
CFSWP-009-SW	6/12/2017	188	0.27	1.15	0.27	1.31	124.29	144.5	20.49	3757	3757	4.95	4.95	7.11	7.11	88.71	88.98	88.98	201.69	204.56	204.56
CFSWP-009-SW	6/14/2018	163	0.24	1.04	0.24	1.17	110.58	128.6	18.14	---	3301	4.25	4.25	5.93	5.93	78.63	78.86	78.86	178.72	181.26	181.26
CFSWP-010-SW	3/15/2017	138	---	---	0.21	1.02	---	112.2	15.74	---	2838	---	---	4.79	4.79	---	68.50	68.50	---	157.41	157.41
CFSWP-010-SW	6/7/2016	164	---	---	0.24	1.17	---	129.2	18.24	---	3319	---	---	5.97	5.97	---	79.27	79.27	---	182.20	182.20
CFSWP-010-SW	6/12/2017	180	0.26	1.12	0.26	1.26	119.94	139.5	19.75	3612	3612	4.73	4.73	6.72	6.72	85.51	85.77	85.77	194.40	197.16	197.16
CFSWP-010-SW	6/14/2018	167	0.24	1.06	0.24	1.19	112.80	131.2	18.52	---	3374	4.37	4.37	6.11	6.11	80.26	80.50	80.50	182.43	185.02	185.02
CFSWP-011-SW	4/3/2017	170	---	---	0.25	1.21	---	133.1	18.81	---	3429	---	---	6.25	6.25	---	81.72	81.72	---	187.83	187.83
CFSWP-																					

Table D-1
Summary of Ecological Screening Values Adjusted for Hardness
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent Fraction			Cadmium				Chromium, Total		Copper	Fluoride		Lead				Nickel			Zinc		
Sample Name	Sample Date	Hardness (as CaCO ₃) (mg/L)	F		U		F	U	U	F	U	F		U		F	U		F	U	
			Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	
CFSWP-019-SW	4/3/2017	180	---	---	0.26	1.26	---	139.5	19.75	---	3612	---	---	6.72	6.72	---	85.77	85.77	---	197.16	197.16
CFSWP-019-SW	6/6/2016	180	---	---	0.26	1.26	---	139.5	19.75	---	3612	---	---	6.72	6.72	---	85.77	85.77	---	197.16	197.16
CFSWP-019-SW	6/15/2017	168	0.24	1.06	0.24	1.20	113.35	131.8	18.62	3393	3393	4.39	4.39	6.16	6.16	80.66	80.90	80.90	183.36	185.96	185.96
CFSWP-019-SW	6/21/2018	171	0.25	1.07	0.25	1.21	115.01	133.7	18.90	---	3448	4.48	4.48	6.30	6.30	81.88	82.13	82.13	186.13	188.77	188.77
CFSWP-019-SW	10/16/2018	168	0.24	1.06	0.24	1.20	113.35	131.8	18.62	---	3393	4.39	4.39	6.16	6.16	80.66	80.90	80.90	183.36	185.96	185.96
CFSWP-019-SW	11/7/2017	535	0.64	2.53	0.64	3.01	292.70	340.4	50.09	---	9701	14.66	14.66	26.91	26.91	214.90	215.55	215.55	489.25	496.19	496.19
CFSWP-019-SW	12/1/2016	208	---	---	0.29	1.42	---	157.0	22.34	---	4118	---	---	8.08	8.08	---	96.93	96.93	---	222.85	222.85
CFSWP-020-SW	3/16/2017	160	---	---	0.23	1.15	---	126.6	17.86	---	3246	---	---	5.79	5.79	---	77.63	77.63	---	178.43	178.43
CFSWP-020-SW	6/6/2016	176	---	---	0.25	1.24	---	136.9	19.37	---	3539	---	---	6.53	6.53	---	84.15	84.15	---	193.44	193.44
CFSWP-020-SW	6/15/2017	160	0.23	1.02	0.23	1.15	108.91	126.6	17.86	3246	3246	4.17	4.17	5.79	5.79	77.40	77.63	77.63	175.93	178.43	178.43
CFSWP-020-SW	6/21/2018	155	0.23	1.00	0.23	1.12	106.12	123.4	17.38	---	3154	4.03	4.03	5.56	5.56	75.35	75.58	75.58	171.26	173.69	173.69
CFSWP-020-SW	10/11/2018	144	0.21	0.94	0.21	1.06	99.91	116.2	16.32	---	2950	3.73	3.73	5.06	5.06	70.80	71.01	71.01	160.91	163.19	163.19
CFSWP-020-SW	11/7/2017	1740	1.70	6.09	1.70	7.71	768.98	894.2	137.22	---	28274	45.03	45.03	120.74	120.74	582.86	584.61	584.61	1328.96	1347.83	1347.83
CFSWP-020-SW	12/1/2016	256	---	---	0.35	1.67	---	186.1	26.68	---	4971	---	---	10.53	10.53	---	115.54	115.54	---	265.72	265.72
CFSWP-058-SW	6/21/2018	159	0.23	1.02	0.23	1.14	108.35	126.0	17.76	---	3228	4.14	4.14	5.74	5.74	76.99	77.22	77.22	175.00	177.48	177.48
CFSWP-058-SW	10/11/2018	224	0.31	1.32	0.31	1.50	143.47	166.8	23.80	---	4404	5.97	5.97	8.88	8.88	102.89	103.20	103.20	233.97	237.29	237.29
CFSWP-059-SW	6/22/2018	159	0.23	1.02	0.23	1.14	108.35	126.0	17.76	---	3228	4.14	4.14	5.74	5.74	76.99	77.22	77.22	175.00	177.48	177.48
CFSWP-059-SW	10/11/2018	188	0.27	1.15	0.27	1.31	124.29	144.5	20.49	---	3757	4.95	4.95	7.11	7.11	88.71	88.98	88.98	201.69	204.56	204.56
CFSWP-060-SW	6/22/2018	159	0.23	1.02	0.23	1.14	108.35	126.0	17.76	---	3228	4.14	4.14	5.74	5.74	76.99	77.22	77.22	175.00	177.48	177.48
CFSWP-060-SW	10/16/2018	152	0.22	0.98	0.22	1.10	104.43	121.4	17.09	---	3098	3.95	3.95	5.42	5.42	74.11	74.34	74.34	168.45	170.84	170.84
CFSWP-021-SW	3/15/2017	204	---	---	0.29	1.40	---	154.5	21.98	---	4046	---	---	7.89	7.89	---	95.35	95.35	---	219.21	219.21
CFSWP-021-SW	6/6/2016	168	---	---	0.24	1.20	---	131.8	18.62	---	3393	---	---	6.16	6.16	---	80.90	80.90	---	185.96	185.96
CFSWP-021-SW	6/15/2017	184	0.26	1.14	0.26	1.29	122.12	142.0	20.12	3685	3685	4.84	4.84	6.91	6.91	87.12	87.38	87.38	198.05	200.86	200.86
CFSWP-021-SW	6/19/2018	187	0.27	1.15	0.27	1.30	123.75	143.9	20.40	---	3739	4.93	4.93	7.06	7.06	88.32	88.58	88.58	200.78	203.63	203.63
CFSWP-021-SW	11/30/2016	304	---	---	0.40	1.92	---	214.2	30.90	---	5810	---	---	13.10	13.10	---	133.62	133.62	---	307.37	307.37
CFSWP-022-SW	4/3/2017	166	---	---	0.24	1.18	---	130.5	18.43	---	3356	---	---	6.07	6.07	---	80.09	80.09	---	184.08	184.08
CFSWP-022-SW	6/6/2016	172	---	---	0.25	1.22	---	134.4	18.99	---	3466	---	---	6.35	6.35	---	82.53	82.53	---	189.71	189.71
CFSWP-022-SW	6/20/2018	167	0.24	1.06	0.24	1.19	112.80	131.2	18.52	---	3374	4.37	4.37	6.11	6.11	80.26	80.50	80.50	182.43	185.02	185.02
CFSWP-046-SW	6/19/2018	270	0.36	1.51	0.36	1.75	167.18	194.4	27.92	---	5217	7.26	7.26	11.27	11.27	120.50	120.86	120.86	274.09	277.98	277.98
CFSWP-047-SW	6/19/2018	179	0.26	1.11	0.26	1.26	119.40	138.8	19.65	---	3594	4.70	4.70	6.68	6.68	85.11	85.36	85.36	193.48	196.23	196.23
CFSWP-048-SW	6/20/2018	175	0.25	1.09	0.25	1.23	117.21	136.3	19.28	---	3521	4.59	4.59	6.49	6.49	83.50	83.75	83.75	189.81	192.51	192.51
CFSWP-049-SW	6/20/2018	226	0.31	1.32	0.31	1.51	144.52	168.0	23.99	---	4440	6.02	6.02	8.98	8.98	103.67	103.98	103.98	235.74	239.09	239.09
CFSWP-050-SW	6/21/2018	183	0.26	1.13	0.26	1.28	121.58	141.4	20.03	---	3666	4.81	4.81	6.87	6.87	86.71	86.98	86.98	197.14	199.94	199.94
CFSWP-051-SW	6/21/2018	187	0.27	1.15	0.27	1.30	123.75	143.9	20.40	---	3739	4.93	4.93	7.06	7.06	88.32	88.58	88.58	200.78	203.63	203.63
CFSWP-052-SW	6/18/2018	246	0.33	1.41	0.33	1.62	154.91	180.1	25.79	---	4795	6.58	6.58	10.01	10.01	111.38	111.71	111.71	253.30	256.89	256.89
CFSWP-053-SW	6/18/2018	171	0.25	1.07	0.25	1.21	115.01	133.7	18.90	---	3448	4.48	4.48	6.30	6.30	81.88	82.13	82.13	186.13	188.77	188.77
CFSWP-																					

Table D-1
Summary of Ecological Screening Values Adjusted for Hardness
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent Fraction			Cadmium				Chromium, Total		Copper	Fluoride		Lead				Nickel			Zinc		
			F		U		F	U	U	F	U	F		U		F	U		F	U	
Sample Name	Sample Date	Hardness (as CaCO ₃) (mg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)		Refined ESV (µg/L)	Refined ESV (µg/L)		Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)
CFSWP-002-SW	6/14/2017	72	0.12	0.56	0.12	0.61	56.63	65.9	9.03	1573	1573	1.75	1.75	2.09	2.09	39.39	39.51	39.51	89.44	90.71	90.71
CFSWP-002-SW	9/16/2016	86	---	---	0.14	0.70	---	76.2	10.51	---	1848	---	---	2.63	2.63	---	45.91	45.91	---	105.44	105.44
CFSWP-002-SW	10/5/2018	82	0.13	0.62	0.13	0.67	63.00	73.3	10.09	---	1770	2.02	2.02	2.47	2.47	43.97	44.10	44.10	99.85	101.27	101.27
CFSWP-002-SW	12/2/2016	92	---	---	0.15	0.74	---	80.5	11.13	---	1965	---	---	2.86	2.86	---	48.61	48.61	---	111.64	111.64
CFSWP-003-SW	3/16/2017	88	---	---	0.14	0.71	---	77.6	10.71	---	1887	---	---	2.70	2.70	---	46.82	46.82	---	107.52	107.52
CFSWP-003-SW	6/6/2018	79.4	0.13	0.60	0.13	0.66	61.36	71.3	9.81	---	1719	1.95	1.95	2.37	2.37	42.79	42.92	42.92	97.17	98.54	98.54
CFSWP-003-SW	6/14/2017	74	0.12	0.57	0.12	0.62	57.92	67.3	9.24	1613	1613	1.81	1.81	2.17	2.17	40.31	40.43	40.43	91.54	92.84	92.84
CFSWP-003-SW	9/9/2016	90	---	---	0.15	0.73	---	79.1	10.92	---	1926	---	---	2.78	2.78	---	47.71	47.71	---	109.58	109.58
CFSWP-003-SW	10/4/2018	132	0.20	0.88	0.20	0.99	93.04	108.2	15.15	---	2726	3.39	3.39	4.53	4.53	65.78	65.97	65.97	149.47	151.59	151.59
CFSWP-003-SW	10/31/2017	125	0.19	0.85	0.19	0.94	88.98	103.5	14.46	---	2595	3.20	3.20	4.23	4.23	62.81	63.00	63.00	142.73	144.75	144.75
CFSWP-003-SW	12/1/2016	108	---	---	0.17	0.84	---	91.8	12.76	---	2273	---	---	3.51	3.51	---	55.67	55.67	---	127.89	127.89
CFSWP-004-SW	3/16/2017	104	---	---	0.16	0.82	---	89.0	12.36	---	2196	---	---	3.34	3.34	---	53.92	53.92	---	123.87	123.87
CFSWP-004-SW	6/6/2018	111	0.17	0.78	0.17	0.86	80.73	93.9	13.06	---	2330	2.81	2.81	3.63	3.63	56.81	56.98	56.98	129.06	130.89	130.89
CFSWP-004-SW	6/14/2017	70	0.12	0.55	0.12	0.59	55.34	64.3	8.81	1534	1534	1.70	1.70	2.02	2.02	38.46	38.58	38.58	87.33	88.57	88.57
CFSWP-004-SW	9/9/2016	222	---	---	0.31	1.49	---	165.6	23.62	---	4369	---	---	8.78	8.78	---	102.42	102.42	---	235.49	235.49
CFSWP-004-SW	10/4/2018	250	0.34	1.43	0.34	1.64	156.97	182.5	26.15	---	4866	6.70	6.70	10.21	10.21	112.91	113.25	113.25	256.78	260.43	260.43
CFSWP-004-SW	10/31/2017	222	0.31	1.31	0.31	1.49	142.42	165.6	23.62	---	4369	5.91	5.91	8.78	8.78	102.11	102.42	102.42	232.20	235.49	235.49
CFSWP-004-SW	12/1/2016	216	---	---	0.30	1.46	---	161.9	23.08	---	4261	---	---	8.48	8.48	---	100.07	100.07	---	230.09	230.09
CFSWP-005-SW	3/16/2017	106	---	---	0.17	0.83	---	90.4	12.56	---	2234	---	---	3.43	3.43	---	54.80	54.80	---	125.88	125.88
CFSWP-005-SW	6/6/2018	107	0.17	0.76	0.17	0.83	78.34	91.1	12.66	---	2253	2.70	2.70	3.47	3.47	55.07	55.24	55.24	125.11	126.89	126.89
CFSWP-005-SW	6/14/2017	130	0.20	0.87	0.20	0.97	91.88	106.8	14.95	2689	2689	3.34	3.34	4.44	4.44	64.93	65.13	65.13	147.55	149.64	149.64
CFSWP-005-SW	9/9/2016	218	---	---	0.30	1.47	---	163.2	23.26	---	4297	---	---	8.58	8.58	---	100.85	100.85	---	231.89	231.89
CFSWP-005-SW	10/18/2018	228	0.31	1.33	0.31	1.52	145.56	169.3	24.17	---	4476	6.08	6.08	9.08	9.08	104.44	104.76	104.76	237.50	240.88	240.88
CFSWP-005-SW	11/1/2017	222	0.31	1.31	0.31	1.49	142.42	165.6	23.62	---	4369	5.91	5.91	8.78	8.78	102.11	102.42	102.42	232.20	235.49	235.49
CFSWP-005-SW	12/1/2016	252	---	---	0.34	1.65	---	183.7	26.33	---	4901	---	---	10.32	10.32	---	114.01	114.01	---	262.19	262.19
CFSWP-006-SW	3/16/2017	88	---	---	0.14	0.71	---	77.6	10.71	---	1887	---	---	2.70	2.70	---	46.82	46.82	---	107.52	107.52
CFSWP-006-SW	6/6/2018	73.4	0.12	0.57	0.12	0.62	57.53	66.9	9.18	---	1601	1.79	1.79	2.15	2.15	40.03	40.16	40.16	90.91	92.20	92.20
CFSWP-006-SW	6/14/2017	70	0.12	0.55	0.12	0.59	55.34	64.3	8.81	1534	1534	1.70	1.70	2.02	2.02	38.46	38.58	38.58	87.33	88.57	88.57
CFSWP-006-SW	9/9/2016	90	---	---	0.15	0.73	---	79.1	10.92	---	1926	---	---	2.78	2.78	---	47.71	47.71	---	109.58	109.58
CFSWP-006-SW	10/4/2018	80	0.13	0.61	0.13	0.66	61.74	71.8	9.88	---	1731	1.97	1.97	2.39	2.39	43.06	43.19	43.19	97.79	99.18	99.18
CFSWP-006-SW	12/1/2016	150	---	---	0.22	1.09	---	120.1	16.90	---	3061	---	---	5.33	5.33	---	73.51	73.51	---	168.93	168.93
CFSWP-007-SW	3/16/2017	82	---	---	0.13	0.67	---	73.3	10.09	---	1770	---	---	2.47	2.47	---	44.10	44.10	---	101.27	101.27
CFSWP-007-SW	6/7/2018	75.4	0.13	0.58	0.13	0.63	58.81	68.4	9.39	---	1641	1.84	1.84	2.22	2.22	40.96	41.08	41.08	93.00	94.32	94.32
CFSWP-007-SW	6/14/2017	72	0.12	0.56	0.12	0.61	56.63	65.9	9.03	1573	1573	1.75	1.75	2.09	2.09	39.39	39.51	39.51	89.44	90.71	90.71
CFSWP-007-SW	9/16/2016	86	---	---	0.14	0.70	---	76.2	10.51	---	1848	---	---	2.63	2.63	---	45.91	45.91	---	105.44	105.44
CFSWP-007-SW	10/3/2018	89.6	0.14	0.66	0.14	0.72	67.74	78.8	10.88	---	1918	2.23	2.23	2.77	2.77	47.39	47.54	47.54	107.64	109.17	109.17
CFSWP-007-SW	12/2/2016	90	---	---	0.15	0.73	---	79.1	10.92	---	1926	---	---	2.78	2.78	---	47.71	47.71	---	109.58	109.58
CFSWP-008-SW	4/4/2017	84	---	---	0.14	0.69	---	74.7	10.30</												

Table D-1
Summary of Ecological Screening Values Adjusted for Hardness
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent Fraction			Cadmium				Chromium, Total		Copper	Fluoride		Lead				Nickel			Zinc		
			F		U		F	U	U	F	U	F		U		F	U		F	U	
Sample Name	Sample Date	Hardness (as CaCO ₃) (mg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)		Refined ESV (µg/L)	Refined ESV (µg/L)		Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)	Refined ESV (µg/L)	Screening-Level ESV (µg/L)	Refined ESV (µg/L)
CFSWP-035-SW	10/5/2018	80	0.13	0.61	0.13	0.66	61.74	71.8	9.88	---	1731	1.97	1.97	2.39	2.39	43.06	43.19	43.19	97.79	99.18	99.18
CFSWP-036-SW	6/6/2018	67.5	0.11	0.53	0.11	0.58	53.72	62.5	8.54	---	1484	1.63	1.63	1.93	1.93	37.29	37.41	37.41	84.68	85.88	85.88
CFSWP-036-SW	10/4/2018	88	0.14	0.65	0.14	0.71	66.75	77.6	10.71	---	1887	2.18	2.18	2.70	2.70	46.68	46.82	46.82	106.01	107.52	107.52
CFSWP-037-SW	6/6/2018	57.6	0.10	0.47	0.10	0.51	47.17	54.9	7.46	---	1285	1.37	1.37	1.58	1.58	32.61	32.71	32.71	74.03	75.08	75.08
CFSWP-037-SW	10/3/2018	89.6	0.14	0.66	0.14	0.72	67.74	78.8	10.88	---	1918	2.23	2.23	2.77	2.77	47.39	47.54	47.54	107.64	109.17	109.17
CFSWP-038-SW	6/7/2018	71.5	0.12	0.56	0.12	0.60	56.31	65.5	8.97	---	1563	1.74	1.74	2.08	2.08	39.16	39.27	39.27	88.91	90.17	90.17
CFSWP-038-SW	10/3/2018	91.5	0.15	0.67	0.15	0.74	68.91	80.1	11.08	---	1955	2.28	2.28	2.84	2.84	48.24	48.39	48.39	109.57	111.13	111.13

Notes:
F: filtered
mg/L: milligram per kilogram
U: unfiltered
µg/L: microgram per liter

Table D-2
Summary of Ecological Screening Values Adjusted for pH and Temperature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent				Nitrogen, Ammonia (As N)		Pentachlorophenol
Fraction				U		U
Sample Name	Sample Date	pH (s.u.)	Water Temperature (°C)	Screening-Level ESV (ug/L)	Refined ESV (ug/L)	Refined ESV (ug/L)
CFSWP-014-SW	3/13/2017	8.28	4.17	1163	1163	---
CFSWP-014-SW	6/11/2018	6.68	10.36	3846	3846	---
CFSWP-014-SW	6/13/2017	8.22	12.32	910	910	---
CFSWP-014-SW	8/29/2016	7.35	18.83	1690	1690	---
CFSWP-014-SW	10/10/2018	7.61	7.81	2758	2758	---
CFSWP-014-SW	11/30/2016	8.14	4.1	1455	1455	---
CFSWP-015-SW	3/13/2017	8.28	4.79	1163	1163	---
CFSWP-015-SW	6/11/2018	7.29	10.25	3059	3059	---
CFSWP-015-SW	6/13/2017	7.85	12.86	1512	1512	---
CFSWP-015-SW	8/29/2016	7.38	18.45	1695	1695	---
CFSWP-015-SW	10/9/2018	7.55	8.33	2827	2827	---
CFSWP-015-SW	11/30/2016	8.21	3.92	1303	1303	---
CFSWP-015-SW	12/20/2016	7.48	2.57	3278	3278	---
CFSWP-016-SW	3/13/2017	8.28	4.99	1163	1163	---
CFSWP-016-SW	6/12/2017	8.27	14.73	718	718	---
CFSWP-016-SW	6/12/2018	7.54	9.51	2644	2644	---
CFSWP-016-SW	8/29/2016	7.44	17.71	1698	1698	---
CFSWP-016-SW	10/9/2018	6.27	10.15	4118	4118	---
CFSWP-016-SW	11/30/2016	8	3.85	1797	1797	---
CFSWP-025-SW	3/13/2017	8.28	4.83	1163	1163	---
CFSWP-025-SW	6/12/2018	7.12	9.58	3510	3510	---
CFSWP-025-SW	6/13/2017	8.28	12.3	826	826	---
CFSWP-025-SW	10/10/2018	7.13	5.91	4125	4125	---
CFSWP-025-SW	12/20/2016	7.35	2.61	3624	3624	---
CFSWP-044-SW	6/11/2018	7.78	10.74	1892	1892	---
CFSWP-044-SW	10/10/2018	6.22	8.36	4639	4639	---
CFSWP-045-SW	6/11/2018	7.81	10.41	1862	1862	---
CFSWP-045-SW	10/9/2018	7.42	7.29	3378	3378	---
CFSWP-009-SW	4/3/2017	7.79	4.05	2378	2378	---
CFSWP-009-SW	6/7/2016	8	11.66	1330	1330	---
CFSWP-009-SW	6/12/2017	7.86	11.99	1578	1578	---
CFSWP-009-SW	6/14/2018	6.34	12.33	3555	3555	---
CFSWP-010-SW	3/15/2017	8.39	1.86	968	968	---
CFSWP-010-SW	6/7/2016	8.06	12.58	1148	1148	---
CFSWP-010-SW	6/12/2017	8.36	16.86	539	539	---
CFSWP-010-SW	6/14/2018	7.39	11.86	2574	2574	---
CFSWP-011-SW	4/3/2017	7.94	4.87	1956	1956	---
CFSWP-011-SW	6/7/2016	7.94	12.26	1393	1393	---
CFSWP-011-SW	6/12/2017	8.3	17.37	577	577	---
CFSWP-011-SW	6/14/2018	7.68	12.07	1948	1948	---
CFSWP-012-SW	4/3/2017	7.46	4.23	3333	3333	---
CFSWP-012-SW	6/7/2016	7.88	11.95	1542	1542	---
CFSWP-012-SW	6/12/2017	8.39	16.81	514	514	---
CFSWP-012-SW	6/14/2018	7.44	11.34	2561	2561	---
CFSWP-013-SW	3/15/2017	8.39	3.12	968	968	---
CFSWP-013-SW	6/7/2016	7.81	11.82	1701	1701	---
CFSWP-013-SW	6/12/2017	8.28	15.87	656	656	---
CFSWP-013-SW	6/14/2018	7.71	10.66	2063	2063	---
CFSWP-013-SW	11/30/2016	7.72	3.02	2583	2583	---
CFSWP-039-SW	6/15/2018	6.29	10.44	4035	4035	---
CFSWP-039-SW	10/11/2018	7.04	6.33	4294	4294	---
CFSWP-040-SW	6/15/2018	7.4	11.72	2578	2578	---
CFSWP-041-SW	6/14/2018	7.4	12.3	2483	2483	---
CFSWP-042-SW	6/14/2018	7.48	10.7	2582	2582	---
CFSWP-043-SW	6/14/2018	7.41	11.15	2654	2654	---

Table D-2
Summary of Ecological Screening Values Adjusted for pH and Temperature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent				Nitrogen, Ammonia (As N)		Pentachlorophenol
Fraction				U		U
Sample Name	Sample Date	pH (s.u.)	Water Temperature (°C)	Screening-Level ESV (ug/L)	Refined ESV (ug/L)	Refined ESV (ug/L)
CFSWP-018-SW	4/3/2017	7.22	5.41	3935	3935	---
CFSWP-018-SW	6/6/2016	7.29	17.09	1968	1968	8.96
CFSWP-018-SW	6/15/2017	8.06	11.56	1226	1226	---
CFSWP-018-SW	6/21/2018	7.03	15.33	2520	2520	---
CFSWP-018-SW	10/17/2018	7.84	10.25	1812	1812	---
CFSWP-018-SW	12/1/2016	7.46	1.18	3333	3333	---
CFSWP-019-SW	4/3/2017	7.26	6.32	3844	3844	---
CFSWP-019-SW	6/6/2016	7.54	15.37	1812	1812	11.52
CFSWP-019-SW	6/15/2017	8.27	12.68	819	819	---
CFSWP-019-SW	6/21/2018	7.77	17.61	1229	1229	---
CFSWP-019-SW	10/16/2018	7.81	10.25	1882	1882	---
CFSWP-019-SW	11/7/2017	7.78	0.71	2407	2407	14.66
CFSWP-019-SW	12/1/2016	7.39	3	3521	3521	---
CFSWP-020-SW	3/16/2017	8.64	1.87	635	635	---
CFSWP-020-SW	6/6/2016	7.69	11.08	2053	2053	13.39
CFSWP-020-SW	6/15/2017	8.03	11.3	1303	1303	---
CFSWP-020-SW	6/21/2018	7.67	16.1	1518	1518	---
CFSWP-020-SW	10/11/2018	8.64	6.24	635	635	---
CFSWP-020-SW	11/7/2017	6.34	1.03	5013	5013	3.45
CFSWP-020-SW	12/1/2016	7.58	4.19	2993	2993	---
CFSWP-058-SW	6/21/2018	7.92	17.11	1048	1048	---
CFSWP-058-SW	10/11/2018	7.67	6.4	2730	2730	---
CFSWP-059-SW	6/22/2018	7.4	16.66	1875	1875	---
CFSWP-059-SW	10/11/2018	8.15	6.29	1433	1433	---
CFSWP-060-SW	6/22/2018	7.73	16.38	1395	1395	---
CFSWP-060-SW	10/16/2018	7.63	5.55	2848	2848	---
CFSWP-021-SW	3/15/2017	8.37	3.69	1001	1001	---
CFSWP-021-SW	6/6/2016	7.7	10.26	2141	2141	---
CFSWP-021-SW	6/15/2017	7.64	7.45	2738	2738	---
CFSWP-021-SW	6/19/2018	6.16	10.99	3932	3932	---
CFSWP-021-SW	11/30/2016	8.37	3.19	1001	1001	---
CFSWP-022-SW	4/3/2017	7.09	3.96	4203	4203	---
CFSWP-022-SW	6/6/2016	7.62	11.39	2168	2168	---
CFSWP-022-SW	6/20/2018	7.11	16.15	2309	2309	---
CFSWP-046-SW	6/19/2018	6.93	12.67	3104	3104	---
CFSWP-047-SW	6/19/2018	6.77	10.78	3669	3669	---
CFSWP-048-SW	6/20/2018	6.19	12.48	3565	3565	---
CFSWP-049-SW	6/20/2018	7.25	15.56	2227	2227	---
CFSWP-050-SW	6/21/2018	5.93	14.59	3154	3154	---
CFSWP-051-SW	6/21/2018	7.57	11.33	2286	2286	---
CFSWP-052-SW	6/18/2018	7.27	16.65	2051	2051	---
CFSWP-053-SW	6/18/2018	6.91	13.35	2990	2990	---
CFSWP-023-SW	4/3/2017	7.14	5.34	4105	4105	---
CFSWP-024-SW	6/15/2017	5.37	13.95	3327	3327	1.30
CFSWP-029-SW	6/22/2018	6.53	11.57	3650	3650	---
CFSWP-029-SW	10/18/2018	6.77	6.99	4682	4682	5.31
CFSWP-029-SW	11/1/2017	7.34	7.24	3594	3594	9.42
CFSWP-030-SW	6/22/2018	6.84	11.92	3348	3348	---
CFSWP-030-SW	10/18/2018	7.43	3.48	3415	3415	---
CFSWP-030-SW	11/3/2017	7.02	2.81	4329	4329	6.83
CFSWP-031-SW	6/22/2018	6.96	12.69	3068	3068	---
CFSWP-031-SW	10/18/2018	6.69	6.97	4766	4766	---
CFSWP-031-SW	11/3/2017	6.92	0.7	4488	4488	6.18
CFSWP-032-SW	6/22/2018	5.93	11.63	3817	3817	---
CFSWP-032-SW	10/17/2018	6.77	4.42	4682	4682	---

Table D-2
Summary of Ecological Screening Values Adjusted for pH and Temperature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent				Nitrogen, Ammonia (As N)		Pentachlorophenol
Fraction				U		U
Sample Name	Sample Date	pH (s.u.)	Water Temperature (°C)	Screening-Level ESV (ug/L)	Refined ESV (ug/L)	Refined ESV (ug/L)
CFSWP-032-SW	11/3/2017	7.32	0.18	3699	3699	9.23
CFSWP-033-SW	6/22/2018	6.98	12.41	3101	3101	---
CFSWP-033-SW	10/17/2018	6.78	5.92	4671	4671	---
CFSWP-033-SW	11/3/2017	7.31	1.55	3724	3724	9.14
CFSWP-001-SW	4/4/2017	7.08	3.59	4222	4222	---
CFSWP-001-SW	6/7/2018	5.48	9.89	4317	4317	---
CFSWP-001-SW	6/14/2017	7.43	6.23	3415	3415	---
CFSWP-001-SW	9/16/2016	7.71	12.86	1790	1790	---
CFSWP-001-SW	10/5/2018	7.83	9.67	1905	1905	---
CFSWP-001-SW	12/2/2016	7.98	4.65	1849	1849	---
CFSWP-002-SW	4/4/2017	7.26	3.55	3844	3844	---
CFSWP-002-SW	6/7/2018	6.29	9.9	4177	4177	---
CFSWP-002-SW	6/14/2017	8.18	6.25	1367	1367	---
CFSWP-002-SW	9/16/2016	7.69	12.8	1838	1838	---
CFSWP-002-SW	10/5/2018	7.88	9	1865	1865	---
CFSWP-002-SW	12/2/2016	8.04	4.38	1695	1695	---
CFSWP-003-SW	3/16/2017	8.24	4.45	1241	1241	---
CFSWP-003-SW	6/6/2018	5.65	10.59	4115	4115	---
CFSWP-003-SW	6/14/2017	8.22	6.86	1282	1282	---
CFSWP-003-SW	9/9/2016	6.18	11.72	3746	3746	---
CFSWP-003-SW	10/4/2018	6.97	8.18	4088	4088	---
CFSWP-003-SW	10/31/2017	7.71	6.01	2612	2612	13.66
CFSWP-003-SW	12/1/2016	7.78	4.05	2407	2407	---
CFSWP-004-SW	3/16/2017	8.24	5.07	1241	1241	---
CFSWP-004-SW	6/6/2018	6.18	12.09	3658	3658	---
CFSWP-004-SW	6/14/2017	8.23	6.9	1261	1261	---
CFSWP-004-SW	9/9/2016	6.75	10.66	3715	3715	---
CFSWP-004-SW	10/4/2018	6.75	9.15	4095	4095	---
CFSWP-004-SW	10/31/2017	7.64	8.01	2641	2641	12.73
CFSWP-004-SW	12/1/2016	7.52	6.74	3165	3165	---
CFSWP-005-SW	3/16/2017	8.24	5.18	1241	1241	---
CFSWP-005-SW	6/6/2018	6.57	11.07	3747	3747	---
CFSWP-005-SW	6/14/2017	7.87	7.8	2041	2041	---
CFSWP-005-SW	9/9/2016	6.75	10.6	3730	3730	---
CFSWP-005-SW	10/18/2018	6.81	5.64	4635	4635	5.53
CFSWP-005-SW	11/1/2017	7.07	8.76	3785	3785	7.18
CFSWP-005-SW	12/1/2016	7.5	7.53	3114	3114	---
CFSWP-006-SW	3/16/2017	8.24	2.22	1241	1241	---
CFSWP-006-SW	6/6/2018	7.36	9.25	3113	3113	---
CFSWP-006-SW	6/14/2017	8.2	6.24	1324	1324	---
CFSWP-006-SW	9/9/2016	7.53	12.36	2220	2220	---
CFSWP-006-SW	10/4/2018	5.91	8.41	4702	4702	---
CFSWP-006-SW	12/1/2016	8.23	4.15	1261	1261	---
CFSWP-007-SW	3/16/2017	8.24	2.28	1241	1241	---
CFSWP-007-SW	6/7/2018	7	9.69	3668	3668	---
CFSWP-007-SW	6/14/2017	8.24	6.28	1241	1241	---
CFSWP-007-SW	9/16/2016	7.46	12.49	2339	2339	---
CFSWP-007-SW	10/3/2018	7.01	7.76	4138	4138	---
CFSWP-007-SW	12/2/2016	8.02	4.26	1745	1745	---
CFSWP-008-SW	4/4/2017	7.14	3.95	4105	4105	---
CFSWP-008-SW	6/7/2018	7.18	9.56	3410	3410	---
CFSWP-008-SW	6/14/2017	7.92	6.27	2010	2010	---
CFSWP-008-SW	9/16/2016	7.31	12.36	2636	2636	---
CFSWP-008-SW	10/3/2018	6.7	8.51	4315	4315	---
CFSWP-008-SW	12/2/2016	8.05	3.82	1670	1670	---

Table D-2
Summary of Ecological Screening Values Adjusted for pH and Temperature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent Fraction				Nitrogen, Ammonia (As N)		Pentachlorophenol
				U		U
Sample Name	Sample Date	pH (s.u.)	Water Temperature (°C)	Screening-Level ESV (ug/L)	Refined ESV (ug/L)	Refined ESV (ug/L)
CFSWP-017-SW	4/4/2017	8.24	4.3	1241	1241	---
CFSWP-017-SW	6/7/2018	7.35	9.57	3071	3071	---
CFSWP-017-SW	6/14/2017	8.17	6.31	1388	1388	---
CFSWP-017-SW	9/16/2016	7.28	10.77	2977	2977	---
CFSWP-017-SW	10/3/2018	6.26	7.46	4901	4901	---
CFSWP-017-SW	12/2/2016	7.69	3.79	2671	2671	---
CFSWP-026-SW	6/7/2018	6.96	9.75	3708	3708	---
CFSWP-026-SW	10/5/2018	6.76	8.44	4277	4277	5.26
CFSWP-026-SW	10/31/2017	7.19	5.9	4001	4001	8.10
CFSWP-027-SW	6/6/2018	7	9.39	3740	3740	---
CFSWP-027-SW	10/5/2018	6.54	8.47	4451	4451	4.22
CFSWP-027-SW	10/31/2017	7.56	5.78	3051	3051	11.75
CFSWP-028-SW	6/6/2018	6.93	9.43	3825	3825	---
CFSWP-028-SW	10/4/2018	7.15	9.31	3519	3519	7.78
CFSWP-028-SW	10/31/2017	7.87	5.46	2149	2149	16.04
CFSWP-034-SW	6/7/2018	6.16	9.89	4221	4221	---
CFSWP-034-SW	10/5/2018	7.99	9.2	1582	1582	---
CFSWP-035-SW	6/7/2018	6.73	9.79	3948	3948	---
CFSWP-035-SW	10/5/2018	7.74	9.16	2196	2196	14.08
CFSWP-036-SW	6/6/2018	7.15	9.63	3448	3448	---
CFSWP-036-SW	10/4/2018	6.94	8.09	4156	4156	---
CFSWP-037-SW	6/6/2018	7.18	9.36	3454	3454	---
CFSWP-037-SW	10/3/2018	7.19	8.52	3627	3627	---
CFSWP-038-SW	6/7/2018	7.22	9.52	3345	3345	---
CFSWP-038-SW	10/3/2018	6.96	8.4	4045	4045	---

Notes:

U: unfiltered

µg/L: microgram per liter



Appendix E Refined COPEC Identification Tables

Table E-1
Refined Ecological Screening for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentration s > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	152	152	100%	5540	12606	51200	15645	10794	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	152	9	6%	0.31	0.44	0.61	0.27	0.13	0.27	9	2.3	Yes	[Maximum] > ESV
Arsenic	7440-38-2	152	152	100%	1.6	4.4	8.8	4.8	3.9	6.8	7	1.3	Yes	[Maximum] > ESV
Barium	7440-39-3	152	152	100%	32.6	106.1	392	121.1	154.9	110	45	3.6	No	95% UCL < Background
Cadmium	7440-43-9	152	19	13%	0.29	0.56	1.7	0.35	0.15	0.27	19	6.3	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	154	154	100%	5.3	11.8	80.8	15.6	9.1	26	8	3.1	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	154	150	97%	0.14	0.31	2.16	0.41	---	0.34	20	6.4	No	See Text
Chromium, Trivalent	16065-83-1	154	154	100%	5.09	11.53	78.64	15.23	---	26	8	3	No	See Text
Cobalt	7440-48-4	152	152	100%	2.8	5.1	9.6	5.3	5.8	13	0	<1	No	95% UCL < Background
Copper	7440-50-8	152	152	100%	5.6	14.9	52.6	16.4	11.6	14	73	3.8	Yes	[Maximum] > ESV
Iron	7439-89-6	152	152	100%	6170	13337	21500	13815	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	152	152	100%	2.9	13.7	57.7	22	10.4	11	67	5.2	Yes	[Maximum] > ESV
Manganese	7439-96-5	152	152	100%	161	411	1270	437	465	220	147	5.8	No	95% UCL < Background
Mercury	7439-97-6	152	130	86%	0.0094	0.0228	0.27	0.0208	0.0162	0.013	122	20.8	Yes	[Maximum] > ESV
Nickel	7440-02-0	152	152	100%	6.3	17.9	140	31.7	11.1	38	11	3.7	Yes	[Maximum] > ESV
Selenium	7782-49-2	152	9	6%	0.32	0.47	0.66	0.26	0.13	0.52	3	1.3	Yes	[Maximum] > ESV
Thallium	7440-28-0	152	1	1%	0.13	0.13	0.13	---	0.06	0.05	1	2.6	No	< 5% Detected
Vanadium	7440-62-2	152	152	100%	4.1	11.5	31.8	13.6	11.2	4.7	149	6.8	Yes	[Maximum] > ESV
Zinc	7440-66-6	152	152	100%	22.2	50.4	244	58.8	47.7	46	67	5.3	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	152	126	83%	0.017	0.153	2.4	0.239	0.141	0.098	48	24.5	Yes	[Maximum] > ESV
Fluoride	16984-48-8	152	152	100%	1.55	60.69	571	118.82	1.17	120	19	4.8	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	152	152	100%	1430	21052	81500	22490	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	152	152	100%	4610	9739	27500	10300	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	152	152	100%	324	802	1580	889	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	152	108	71%	26.5	198.3	4750	480.9	32.7	NESV	---	---	No	Essential Nutrient
Dioxins and Furans (mg/kg)														
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	58	41	71%	2.60E-07	9.23E-06	6.97E-05	1.56E-05	1.48E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	58	52	90%	5.80E-07	4.53E-05	6.04E-04	1.50E-04	9.23E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	58	10	17%	4.10E-08	1.20E-06	4.13E-06	7.12E-07	2.60E-08	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	58	41	71%	4.30E-08	1.20E-06	9.63E-06	5.47E-06	1.40E-07	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	39227-28-6	58	19	33%	3.70E-08	1.14E-06	4.07E-06	1.14E-06	1.60E-08	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	58	40	69%	4.40E-08	6.12E-07	4.00E-06	1.03E-06	6.10E-08	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	57653-85-7	58	40	69%	7.50E-08	2.27E-06	1.92E-05	5.41E-06	5.26E-07	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	58	2	3%	5.20E-08	6.40E-08	7.70E-08	---	2.80E-08	NESV	---	---	No	< 5% Detected
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	19408-74-3	58	45	78%	6.10E-08	1.29E-06	9.54E-06	3.08E-06	5.13E-07	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	58	17	29%	1.10E-07	8.60E-07	2.84E-06	6.00E-07	1.00E-08	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	40321-76-4	58	29	50%	2.80E-08	3.18E-07	1.53E-06	5.83E-07	1.07E-07	NESV	---	---	Yes	No ESV Available
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	58	30	52%	3.10E-08	6.15E-07	4.58E-06	2.58E-06	1.16E-07	NESV	---	---	Yes	No ESV Available
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	58	33	57%	5.60E-08	5.83E-07	3.65E-06	3.65E-06	1.40E-08	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	58	33	57%	4.80E-08	1.22E-06	6.15E-06	2.27E-06	1.00E-08	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1746-01-6	58	15	26%	5.10E-08	1.74E-07	5.80E-07	1.48E-07	1.19E-07	NESV	---	---	Yes	No ESV Available
Octachlorodibenzofuran	39001-02-0	58	44	76%	9.30E-07	2.07E-05	1.90E-04	4.24E-05	3.81E-06	NESV	---	---	Yes	No ESV Available
Octachlorodibenzo-P-Dioxin	3268-87-9	58	55	95%	3.02E-06	4.44E-04	6.76E-03	1.58E-03	7.17E-05	NESV	---	---	Yes	No ESV Available
TEC _{2,3,7,8-TCDD-Bird-1/2MDL}	---	58	57	98%	6.55E-08	1.86E-06	1.18E-05	3.86E-06	---	2.08E-07	43	56.7	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-MDL}	---	58	57	98%	1.34E-07	2.25E-06	1.23E-05	4.18E-06	---	2.08E-07	52	59.4	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-Zero}	---	58	57	98%	4.40E-09	1.73E-06	1.18E-05	3.86E-06	---	2.08E-07	40	56.6	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-1/2MDL}	---	58	57	98%	4.72E-08	1.56E-06	1.55E-05	3.18E-06	---	2.90E-07	39	53.5	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-MDL}	---	58	57	98%	1.02E-07	1.80E-06	1.56E-05	4.86E-06	---	2.90E-07	45	53.8	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-Zero}	---	58	57	98%	4.40E-09	1.46E-06	1.55E-05	3.17E-06	---	2.90E-07	38	53.4	Yes	[Maximum] > ESV

Table E-1
Refined Ecological Screening for Bulk Soil (0-2 feet)
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentration s > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Polychlorinated Biphenyls (PCBs) (mg/kg)														
PCB-1254 (Aroclor 1254)	11097-69-1	136	4	3%	0.056	0.073	0.11	---	---	0.041	4	2.7	No	< 5% Detected
Polychlorinated Biphenyl (PCBs)	1336-36-3	136	4	3%	0.056	0.073	0.11	---	---	0.000332	4	331.3	No	< 5% Detected
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	152	112	74%	0.0026	0.4436	15	1.4773	0.0013	0.25	26	60	Yes	[Maximum] > ESV
Anthracene	120-12-7	152	99	65%	0.002	0.983	22	2.581	0.002	6.8	4	3.2	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	152	145	95%	0.0021	5.807	170	20.49	0.0226	10	19	17	Yes	[Maximum] > ESV
Fluorene	86-73-7	152	106	70%	0.0018	0.3234	10	1.00	0.0012	3.7	1	2.7	Yes	[Maximum] > ESV
Naphthalene	91-20-3	152	84	55%	0.0017	0.2584	4	0.52	0.0012	0.0994	28	40.2	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	152	143	94%	0.0027	3.4346	120	13.16	0.0117	5.5	22	21.8	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	152	145	95%	0.00795	10.68	341.6	39.85	0.04218	29	12	11.8	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	152	145	95%	0.0138	10.69	341.9	39.89	0.0422	29	12	11.8	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	152	145	95%	0.0021	10.66	341.4	39.82	0.0422	29	12	11.8	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	152	143	94%	0.0015	3.953	130	14.91	0.0181	62	1	2.1	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	152	134	88%	0.0013	3.671	110	12.85	0.0111	0.73	47	150.7	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	152	145	95%	0.002	5.044	150	18.272	0.032	18	9	8.3	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	152	139	91%	0.0015	3.880	99	12.857	0.0234	25	4	4	Yes	[Maximum] > ESV
Chrysene	218-01-9	152	145	95%	0.0015	4.35	130	15.734	0.0227	3.1	28	41.9	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	152	112	74%	0.0017	1.140	28	3.286	0.0033	14	1	2	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	152	137	90%	0.0029	3.731	100	12.330	0.0183	71	1	1.4	Yes	[Maximum] > ESV
Pyrene	129-00-0	152	144	95%	0.0017	6.428	220	25.132	0.0184	10	19	22	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	152	145	95%	0.01205	33.20	1035	124.4	0.1591	1.1	103	940.9	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	152	145	95%	0.0146	33.21	1035	124.4	0.1591	1.1	103	940.9	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	152	145	95%	0.0095	33.20	1035	124.4	0.1591	1.1	103	940.9	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
3- And 4- Methylphenol (Total)	106445	120	4	3%	0.011	0.023	0.036	---	---	NESV	---	---	No	< 5% Detected
Benzaldehyde	100-52-7	152	6	4%	0.0049	0.0302	0.093	0.0103	0.0237	NESV	---	---	No	< 5% Detected
Benzyl Butyl Phthalate	85-68-7	152	30	20%	0.013	0.516	5.6	0.591	0.016	90	0	<1	No	[Maximum] < ESV
Bis(2-Ethylhexyl) Phthalate	117-81-7	152	47	31%	0.016	0.268	5.8	0.532	0.033	0.02	44	290	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	152	21	14%	0.013	0.038	0.19	0.019	0.01	0.011	21	17.3	Yes	[Maximum] > ESV
Hexachlorobenzene	118-74-1	152	1	1%	0.091	0.091	0.091	---	0.002	0.079	1	1.2	No	< 5% Detected
Pentachlorophenol	87-86-5	151	4	3%	0.17	0.32	0.53	---	0.04	0.36	1	1.5	No	< 5% Detected
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Cyclohexane	110-82-7	64	17	27%	0.00039	0.0011	0.0055	---	---	NESV	---	---	Yes	No ESV Available
Isopropylbenzene (Cumene)	98-82-8	64	1	2%	0.0003	0.0003	0.0003	---	---	NESV	---	---	No	< 5% Detected
Methyl Acetate	79-20-9	64	12	19%	0.0016	0.033	0.32	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	64	29	45%	0.00045	0.00128	0.0076	---	---	NESV	---	---	Yes	No ESV Available
M,P-Xylene	179601-23-1	64	41	64%	0.000091	0.000652	0.0042	---	---	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	64	20	31%	0.00015	0.00058	0.0051	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table E-2
Refined Ecological Screening for Bulk Soil (0-2 feet)
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	110	110	100%	4500	13702	36800	15561	10794	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	110	4	4%	0.37	0.91	1.5	---	0.13	0.27	4	5.6	No	< 5% Detected
Arsenic	7440-38-2	110	110	100%	2.8	6.2	17.9	6.6	3.9	6.8	33	2.6	Yes	[Maximum] > ESV
Barium	7440-39-3	110	110	100%	40.7	133.5	436	196.6	154.9	110	51	4	Yes	[Maximum] > ESV
Beryllium	7440-41-7	110	108	98%	0.24	0.6	4.7	0.6	0.51	2.5	2	1.9	Yes	[Maximum] > ESV
Cadmium	7440-43-9	110	5	5%	0.27	0.77	1.6	---	0.15	0.27	4	5.9	No	< 5% Detected
Chromium, Total	7440-47-3	118	117	99%	2.4	11	84.8	13.8	9.1	26	1	3.3	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	118	110	93%	0.06	0.29	2.27	0.36	---	0.34	18	6.7	No	See Text
Chromium, Trivalent	16065-83-1	118	117	99%	2.34	10.7	82.53	13.44	---	26	1	3.2	No	See Text
Cobalt	7440-48-4	110	110	100%	1.5	5.7	13	5.7	5.8	13	0	1	No	95% UCL < Background
Copper	7440-50-8	110	110	100%	5.9	81	7260	720.9	11.6	14	48	518.6	Yes	[Maximum] > ESV
Iron	7439-89-6	110	110	100%	2940	14944	37100	16333	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	110	110	100%	5.9	12.9	63.7	14.8	10.4	11	52	5.8	Yes	[Maximum] > ESV
Manganese	7439-96-5	110	110	100%	129	455	1140	511	465	220	106	5.2	Yes	[Maximum] > ESV
Nickel	7440-02-0	110	110	100%	4.9	23.8	534	23.5	11.1	38	7	14.1	Yes	[Maximum] > ESV
Selenium	7782-49-2	110	16	15%	0.34	0.83	3	0.33	0.13	0.52	7	5.8	Yes	[Maximum] > ESV
Thallium	7440-28-0	110	16	15%	0.11	0.25	1.1	0.11	0.06	0.05	16	22	Yes	[Maximum] > ESV
Vanadium	7440-62-2	110	110	100%	3	14	151	15	11	4.7	108	32.1	Yes	[Maximum] > ESV
Zinc	7440-66-6	110	110	100%	28.7	49.5	114	56	47.7	46	51	2.5	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	110	75	68%	0.016	0.576	13	1.18	0.141	0.098	40	132.7	Yes	[Maximum] > ESV
Fluoride	16984-48-8	110	110	100%	3.24	60.9	796	140.05	1.17	120	10	6.6	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	110	110	100%	921	29670	313000	33545	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	110	110	100%	2890	10283	18800	10507	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	110	110	100%	332	1095	10900	1077	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	110	76	69%	33	370	5170	618	33	NESV	---	---	No	Essential Nutrient
Dioxins and Furans (mg/kg)														
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	4	2	50%	5.13E-06	5.25E-06	5.37E-06	---	1.48E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (H	35822-46-9	4	4	100%	1.38E-06	2.84E-05	7.63E-05	---	9.23E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	4	2	50%	1.06E-06	1.36E-06	1.67E-06	---	1.40E-07	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	4	4	100%	1.70E-07	4.40E-07	7.80E-07	---	6.00E-08	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	57653-85-7	4	3	75%	3.00E-07	1.50E-06	2.50E-06	---	5.00E-07	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	19408-74-3	4	2	50%	7.00E-07	9.00E-07	1.10E-06	---	5.00E-07	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	40321-76-4	4	2	50%	7.30E-08	1.96E-07	3.20E-07	---	1.07E-07	NESV	---	---	Yes	No ESV Available
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	4	1	25%	5.70E-07	5.70E-07	5.70E-07	---	1.20E-07	NESV	---	---	Yes	No ESV Available
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	4	3	75%	1.10E-07	4.50E-07	9.50E-07	---	1.00E-08	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	4	3	75%	4.60E-07	9.80E-07	1.78E-06	---	1.00E-08	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1746-01-6	4	1	25%	2.70E-07	2.70E-07	2.70E-07	---	1.20E-07	NESV	---	---	Yes	No ESV Available
Octachlorodibenzofuran	39001-02-0	4	2	50%	7.31E-06	1.21E-05	1.68E-05	---	3.81E-06	NESV	---	---	Yes	No ESV Available
Octachlorodibenzo-P-Dioxin	3268-87-9	4	4	100%	8.87E-06	3.04E-04	8.91E-04	---	7.17E-05	NESV	---	---	Yes	No ESV Available
TEC _{2,3,7,8-TCDD-Bird-1/2MDL}	---	4	4	100%	1.61E-07	1.60E-06	3.67E-06	---	---	2.08E-07	3	17.6	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-MDL}	---	4	4	100%	6.29E-07	2.21E-06	4.39E-06	---	---	2.08E-07	4	21.1	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-Zero}	---	4	4	100%	2.03E-08	1.51E-06	3.60E-06	---	---	2.08E-07	3	17.3	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-1/2MDL}	---	4	4	100%	1.38E-07	1.11E-06	1.90E-06	---	---	2.90E-07	3	6.6	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-MDL}	---	4	4	100%	5.77E-07	1.69E-06	2.75E-06	---	---	2.90E-07	4	9.5	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-Zero}	---	4	4	100%	3.45E-08	1.03E-06	1.83E-06	---	---	2.90E-07	3	6.3	Yes	[Maximum] > ESV
Polychlorinated Biphenyls (PCBs) (mg/kg)														
PCB-1254 (Aroclor 1254)	11097-69-1	70	6	9%	0.062	0.472	1.2	---	---	0.041	6	29.3	Yes	[Maximum] > ESV
Polychlorinated Biphenyl (PCBs)	1336-36-3	70	6	9%	0.062	0.472	1.2	---	---	0.000332	6	3614.5	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
2-Methylnaphthalene	91-57-6	110	27	25%	0.0016	0.2564	3.9	0.2127	0.0011	3.24	1	1.2	Yes	[Maximum] > ESV

Table E-2
Refined Ecological Screening for Bulk Soil (0-2 feet)
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Acenaphthene	83-32-9	110	68	62%	0.0022	0.8178	28	2.2378	0.0013	0.25	6	112	Yes	[Maximum] > ESV
Anthracene	120-12-7	110	72	65%	0.002	1.471	48	4.755	0.002	6.8	2	7.1	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	110	108	98%	0.01	5.6	240	25.01	0.02	10	5	24	Yes	[Maximum] > ESV
Fluorene	86-73-7	110	69	63%	0.0014	0.6958	25	1.9173	0.0012	3.7	2	6.8	Yes	[Maximum] > ESV
Naphthalene	91-20-3	110	47	43%	0.0014	0.3476	10	0.4838	0.0012	0.0994	5	100.6	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	110	106	96%	0.0052	4.4839	240	18.3935	0.0117	5.5	5	43.6	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	110	108	98%	0.02055	12.18888	595.9	54.00052	0.04218	29	3	20.5	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	110	108	98%	0.0256	12.2059	595.9	54.0108	0.0422	29	3	20.5	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	110	108	98%	0.0155	12.1719	595.9	53.9902	0.0422	29	3	20.5	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	110	105	95%	0.0057	2.4132	100	10.919	0.0181	62	2	1.6	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	110	102	93%	0.005	2.571	100	10.661	0.011	0.73	14	137	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	110	106	96%	0.0093	3.4379	120	13.4047	0.0321	18	4	6.7	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	110	102	93%	0.0051	1.9895	62	7.3325	0.0234	25	2	2.5	Yes	[Maximum] > ESV
Chrysene	218-01-9	110	109	99%	0.007	3.353	110	12.08	0.023	3.1	7	35.5	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	110	89	81%	0.0016	0.7165	21	2.3409	0.0033	14	2	1.5	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	110	101	92%	0.0031	2.1718	76	8.6843	0.0183	71	1	1.1	Yes	[Maximum] > ESV
Pyrene	129-00-0	110	105	95%	0.0083	3.718	150	16.3431	0.0184	10	5	15	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	110	109	99%	0.0477	20.7267	789	87.2203	0.1591	1.1	61	717.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	110	109	99%	0.0485	20.7321	789	87.2236	0.1591	1.1	62	717.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	110	109	99%	0.011	20.721	789	87.217	0.159	1.1	61	717.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
3- And 4- Methylphenol (Total)	106445	54	4	7%	0.012	0.271	1	---	---	NESV	---	---	Yes	No ESV Available
Benzaldehyde	100-52-7	110	10	9%	0.0049	0.0171	0.082	0.0106	0.0237	NESV	---	---	No	95% UCL < Background
Benzyl Butyl Phthalate	85-68-7	110	7	6%	0.013	0.198	0.98	0.097	0.016	90	0	<1	No	[Maximum] < ESV
Bis(2-Ethylhexyl) Phthalate	117-81-7	110	14	13%	0.025	0.252	2.5	0.279	0.033	0.02	14	125	Yes	[Maximum] > ESV
Caprolactam	105-60-2	110	2	2%	0.039	0.052	0.066	---	0.015	NESV	---	---	No	< 5% Detected
Dibenzofuran	132-64-9	110	52	47%	0.0016	0.5221	15	1.0126	0.0011	6.1	2	2.5	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	110	6	5%	0.013	0.033	0.056	0.016	0.01	0.011	6	5.1	Yes	[Maximum] > ESV
Phenol	108-95-2	110	4	4%	0.016	0.349	1.2	---	0.007	0.79	1	1.5	No	< 5% Detected
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Cyclohexane	110-82-7	27	1	4%	0.00052	0.00052	0.00052	---	---	NESV	---	---	No	< 5% Detected
Isopropylbenzene (Cumene)	98-82-8	27	1	4%	0.00034	0.00034	0.00034	---	---	NESV	---	---	No	< 5% Detected
Methyl Acetate	79-20-9	27	7	26%	0.0028	0.0088	0.017	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	27	5	19%	0.00042	0.00067	0.001	---	---	NESV	---	---	Yes	No ESV Available
M,P-Xylene	179601-23-1	27	10	37%	0.00012	0.00063	0.0038	---	---	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	27	2	7%	0.00022	0.00091	0.0016	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table E-3
Refined Ecological Screening for Bulk Soil (0-2 feet)
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	6	6	100%	9660	20377	38900	29605	10794	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	6	3	50%	0.32	1.15	2.8	---	0.13	0.27	3	10.4	Yes	[Maximum] > ESV
Arsenic	7440-38-2	6	6	100%	4.5	9	23.5	21.8	3.9	6.8	3	3.5	Yes	[Maximum] > ESV
Barium	7440-39-3	6	6	100%	64.2	122.9	227	221.4	154.9	110	2	2.1	Yes	[Maximum] > ESV
Beryllium	7440-41-7	6	6	100%	0.3	1.6	7.2	6.5	0.5	2.5	1	2.9	Yes	[Maximum] > ESV
Cadmium	7440-43-9	6	2	33%	0.36	0.65	0.94	---	0.15	0.27	2	3.5	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	6	6	100%	8.4	16	39.2	35.8	9.1	26	1	1.5	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	6	6	100%	0.22	0.43	1.05	0.96	---	0.34	3	3.1	No	See Text
Chromium, Trivalent	16065-83-1	6	6	100%	8.17	15.59	38.15	34.8	---	26	1	1.5	No	See Text
Cobalt	7440-48-4	6	6	100%	5.1	7.4	16	10.9	5.8	13	1	1.2	Yes	[Maximum] > ESV
Copper	7440-50-8	6	6	100%	11.3	23.5	54.6	50.6	11.6	14	5	3.9	Yes	[Maximum] > ESV
Iron	7439-89-6	6	6	100%	12100	15850	20600	18180	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	6	6	100%	7.6	13.3	19.4	16.7	10.4	11	5	1.8	Yes	[Maximum] > ESV
Manganese	7439-96-5	6	6	100%	303	369	481	422	465	220	6	2.2	No	95% UCL < Background
Nickel	7440-02-0	6	6	100%	12.4	98.7	463	417.8	11.1	38	2	12.2	Yes	[Maximum] > ESV
Selenium	7782-49-2	6	3	50%	0.37	0.5	0.75	---	0.13	0.52	1	1.4	Yes	[Maximum] > ESV
Thallium	7440-28-0	6	2	33%	0.14	0.16	0.17	---	0.06	0.05	2	3.4	Yes	[Maximum] > ESV
Vanadium	7440-62-2	6	6	100%	7.4	40.6	169	153.2	11.2	4.7	6	36	Yes	[Maximum] > ESV
Zinc	7440-66-6	6	6	100%	36.9	54.6	67	65	47.7	46	4	1.5	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	6	1	17%	0.19	0.19	0.19	---	0.14	0.098	1	1.9	Yes	[Maximum] > ESV
Fluoride	16984-48-8	6	6	100%	4.23	79.03	398	357.58	1.17	120	1	3.3	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	6	6	100%	3160	31610	46700	45432	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	6	6	100%	7260	10967	13400	13268	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	6	6	100%	658	1830	6760	6140	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	6	6	100%	38.3	8272.9	49200	43952.4	32.7	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	6	6	100%	0.0093	0.9612	3.4	2.7666	0.0013	0.25	2	13.6	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	6	6	100%	0.19	16.85	71	67.3	0.02	10	2	7.1	Yes	[Maximum] > ESV
Naphthalene	91-20-3	6	5	83%	0.0077	0.3949	1.8	1.6398	0.0012	0.0994	2	18.1	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	6	6	100%	0.067	8.308	40	36.472	0.012	5.5	2	7.3	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	6	6	100%	0.29	28.58	125.75	117.4	0.04	29	2	4.3	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	6	6	100%	0.2923	28.5893	125.787	117.4372	0.0422	29	2	4.3	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	6	6	100%	0.2877	28.5608	125.71	117.3562	0.0422	29	2	4.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	6	6	100%	0.17	13.28	53	51.32	0.02	62	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	6	6	100%	0.15	10.82	43	41.75	0.01	0.73	4	58.9	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	6	6	100%	0.27	14.68	60	57.45	0.03	18	2	3.3	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	6	6	100%	0.22	11.49	43	42.78	0.02	25	1	1.7	Yes	[Maximum] > ESV
Chrysene	218-01-9	6	6	100%	0.19	12.6	51	49.01	0.02	3.1	2	16.5	Yes	[Maximum] > ESV
Pyrene	129-00-0	6	6	100%	0.19	16.04	67	63.63	0.02	10	2	6.7	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	6	6	100%	1.509	97.025	388	375.069	0.159	1.1	6	352.7	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	6	6	100%	1.509	97.025	388	375.069	0.159	1.1	6	352.7	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	6	6	100%	1.509	97.025	388	375.069	0.159	1.1	6	352.7	Yes	[Maximum] > ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-4
Refined Ecological Screening for Bulk Soil (0-2 feet)
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	37	37	100%	5350	16218	30300	18806	10794	NESV	---	---	No	pH > 5.5
Arsenic	7440-38-2	37	37	100%	2	5	12	6	4	6.8	5	1.8	Yes	[Maximum] > ESV
Barium	7440-39-3	37	37	100%	45.3	371.3	1060	579.4	154.9	110	31	9.6	Yes	[Maximum] > ESV
Cadmium	7440-43-9	37	6	16%	0.38	0.59	0.7	0.42	0.15	0.27	6	2.6	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	37	37	100%	0.15	0.22	0.42	0.26	---	0.34	1	1.2	No	See Text
Cobalt	7440-48-4	37	37	100%	3	5	7	5	6	13	0	<1	No	95% UCL < Background
Copper	7440-50-8	37	37	100%	4.7	11.1	25.5	13.3	11.6	14	7	1.8	Yes	[Maximum] > ESV
Iron	7439-89-6	37	37	100%	8490	12383	21800	13988	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	37	37	100%	4.5	13.4	36.2	18.5	10.4	11	21	3.3	Yes	[Maximum] > ESV
Manganese	7439-96-5	37	37	100%	169	818	3950	1443	465	220	35	18	Yes	[Maximum] > ESV
Mercury	7439-97-6	37	34	92%	0.011	0.028	0.12	0.046	0.016	0.013	29	9.2	Yes	[Maximum] > ESV
Nickel	7440-02-0	37	37	100%	7.4	18.3	68.9	40.7	11.1	38	5	1.8	Yes	[Maximum] > ESV
Selenium	7782-49-2	37	2	5%	0.52	0.58	0.64	---	0.13	0.52	1	1.2	Yes	[Maximum] > ESV
Thallium	7440-28-0	37	7	19%	0.11	0.13	0.15	0.12	0.06	0.05	7	3	Yes	[Maximum] > ESV
Vanadium	7440-62-2	37	37	100%	4.9	12.3	25.7	16.5	11.2	4.7	37	5.5	Yes	[Maximum] > ESV
Zinc	7440-66-6	37	37	100%	25.3	58.9	150	80.4	47.7	46	24	3.3	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	37	21	57%	0.06	0.23	0.64	0.3	0.14	0.098	17	6.5	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	37	37	100%	1620	11273	54100	15670	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	37	37	100%	2700	7718	15500	8868	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	37	37	100%	327	1057	2070	1284	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	37	26	70%	38.2	93.1	189	86.7	32.7	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Benzo(A)Pyrene	50-32-8	37	37	100%	0.0026	0.2573	1.9	0.6724	0.0181	62	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	37	35	95%	0.0023	0.1813	1.5	0.474	0.0111	0.73	2	2.1	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	37	37	100%	0.02445	2.72233	21.42	7.19722	0.15913	1.1	17	19.5	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	37	37	100%	0.0263	2.7244	21.42	7.1844	0.1591	1.1	17	19.5	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	37	37	100%	0.0226	2.7203	21.42	7.2114	0.1591	1.1	17	19.5	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
3- And 4- Methylphenol (Total)	106445	7	2	29%	0.01	0.04	0.07	---	---	NESV	---	---	Yes	No ESV Available
Benzaldehyde	100-52-7	37	14	38%	0.0048	0.0129	0.06	0.0183	0.0237	NESV	---	---	No	95% UCL < Background
Bis(2-Ethylhexyl) Phthalate	117-81-7	37	8	22%	0.016	0.091	0.15	---	0.033	0.02	7	7.5	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	37	1	3%	0.22	0.22	0.22	---	0.01	0.011	1	20	No	< 5% Detected

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-5
Refined Ecological Screening for Bulk Soil (0-2 feet)
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	54	54	100%	6230	15154	29400	17635	10794	NESV	---	---	No	pH > 5.5
Arsenic	7440-38-2	54	54	100%	2.4	6	15.3	6.3	3.9	6.8	15	2.3	Yes	[Maximum] > ESV
Barium	7440-39-3	54	54	100%	57.9	208.7	482	295.5	154.9	110	38	4.4	Yes	[Maximum] > ESV
Cadmium	7440-43-9	54	2	4%	0.3	0.3	0.4	---	0.2	0.27	2	1.4	No	< 5% Detected
Chromium, Hexavalent	18540-29-9	54	54	100%	0.12	0.26	0.36	0.27	---	0.34	3	1.1	No	See Text
Cobalt	7440-48-4	54	54	100%	2.7	5.5	8.6	5.8	5.8	13	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	54	54	100%	3.5	12.9	26.7	13.5	11.6	14	20	1.9	Yes	[Maximum] > ESV
Iron	7439-89-6	54	54	100%	6880	15309	23400	16252	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	54	54	100%	7	12	22	13	10	11	34	2	Yes	[Maximum] > ESV
Manganese	7439-96-5	54	54	100%	175	586	2620	1140	465	220	52	11.9	Yes	[Maximum] > ESV
Nickel	7440-02-0	54	54	100%	5.1	12.3	35.7	15.1	11.1	38	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	54	8	15%	0.26	0.38	0.5	0.3	0.13	0.52	0	<1	No	[Maximum] < ESV
Thallium	7440-28-0	54	3	6%	0.11	0.14	0.19	---	0.06	0.05	3	3.8	Yes	[Maximum] > ESV
Vanadium	7440-62-2	54	54	100%	4.6	11.6	20.4	13.4	11.2	4.7	53	4.3	Yes	[Maximum] > ESV
Zinc	7440-66-6	54	54	100%	30.5	54.9	116	67.7	47.7	46	31	2.5	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	54	26	48%	0.042	0.153	0.42	0.158	0.141	0.098	16	4.3	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	54	54	100%	1120	11984	170000	42371	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	54	54	100%	3280	8571	14800	8562	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	54	54	100%	400	942	1620	1098	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	54	36	67%	34.3	58.1	168	63.3	32.7	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Total HMW PAHs - 1/2MDL	---	54	49	91%	0.01105	0.52283	4.14	1.1373	0.15913	1.1	6	3.8	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	54	49	91%	0.0153	0.5277	4.14	1.1388	0.1591	1.1	6	3.8	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	54	49	91%	0.0068	0.518	4.14	1.1368	0.1591	1.1	6	3.8	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzaldehyde	100-52-7	54	15	28%	0.0052	0.0099	0.018	0.0087	0.0237	NESV	---	---	No	95% UCL < Background
Bis(2-Ethylhexyl) Phthalate	117-81-7	54	21	39%	0.043	0.159	0.66	0.121	0.033	0.02	21	33	Yes	[Maximum] > ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Methyl Acetate	79-20-9	4	3	75%	0.0019	0.0926	0.27	---	---	NESV	---	---	Yes	#N/A

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-6
Refined Ecological Screening for Bulk Soil (0-2 feet)
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentration s > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	82	82	100%	5230	17154	30900	18989	10794	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	82	1	1%	0.36	0.36	0.36	---	0.13	0.27	1	1.3	No	< 5% Detected
Arsenic	7440-38-2	82	82	100%	2	5	16	6	4	6.8	14	2.3	Yes	[Maximum] > ESV
Barium	7440-39-3	82	82	100%	74.5	248.7	533	306.7	154.9	110	72	4.8	Yes	[Maximum] > ESV
Beryllium	7440-41-7	82	81	99%	0.21	0.65	1.2	0.73	0.51	2.5	0	<1	No	[Maximum] < ESV
Cadmium	7440-43-9	82	3	4%	0.48	0.64	0.78	---	0.15	0.27	3	2.9	No	< 5% Detected
Chromium, Hexavalent	18540-29-9	82	82	100%	0.11	0.29	0.56	0.32	---	0.34	23	1.6	No	See Text
Cobalt	7440-48-4	82	82	100%	2.2	5.5	7.4	5.8	5.8	13	0	<1	No	95% UCL < Background
Copper	7440-50-8	82	82	100%	6.6	15.6	33.2	17.7	11.6	14	43	2.4	Yes	[Maximum] > ESV
Iron	7439-89-6	82	82	100%	5720	14693	21100	15367	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	82	82	100%	4.3	12.4	44.8	15.6	10.4	11	46	4.1	Yes	[Maximum] > ESV
Manganese	7439-96-5	82	82	100%	36.1	426.8	2210	625.9	464.9	220	65	10	Yes	[Maximum] > ESV
Nickel	7440-02-0	82	82	100%	4.2	11	17.4	12	11.1	38	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	82	23	28%	0.29	0.62	1.1	0.45	0.13	0.52	14	2.1	Yes	[Maximum] > ESV
Thallium	7440-28-0	82	3	4%	0.12	0.22	0.41	---	0.06	0.05	3	8.2	No	< 5% Detected
Vanadium	7440-62-2	82	82	100%	4	12	21	13	11	4.7	79	4.6	Yes	[Maximum] > ESV
Zinc	7440-66-6	82	82	100%	10.1	51.1	238	67.2	47.7	46	41	5.2	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	82	55	67%	0.022	0.183	2.2	0.435	0.141	0.098	33	22.4	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	82	82	100%	988	9876	177000	30554	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	82	82	100%	2110	7831	18300	8471	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	82	82	100%	335	931	1530	1100	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	82	67	82%	29.8	109.9	555	158.7	32.7	NESV	---	---	No	Essential Nutrient
Dioxins and Furans (mg/kg)														
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	20	4	20%	8.60E-07	1.19E-06	2.03E-06	---	1.48E-06	NESV	---	---	Yes	No ESV Available
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	20	13	65%	4.50E-07	3.31E-06	6.36E-06	4.70E-06	9.23E-06	NESV	---	---	No	95% UCL < Background
1,2,3,4,7,8-Hexachlorodibenzofuran	70648-26-9	20	4	20%	7.50E-08	3.06E-07	8.00E-07	---	1.40E-07	NESV	---	---	Yes	No ESV Available
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	39227-28-6	20	1	5%	1.07E-06	1.07E-06	1.07E-06	---	2.00E-08	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	20	10	50%	9.70E-08	2.34E-07	7.60E-07	---	6.10E-08	NESV	---	---	Yes	No ESV Available
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	57653-85-7	20	3	15%	2.90E-07	5.70E-07	1.11E-06	---	5.30E-07	NESV	---	---	Yes	No ESV Available
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	19408-74-3	20	7	35%	2.60E-07	4.50E-07	1.29E-06	8.60E-07	5.10E-07	NESV	---	---	Yes	No ESV Available
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	40321-76-4	20	10	50%	4.50E-08	1.16E-07	3.10E-07	1.61E-07	1.07E-07	NESV	---	---	Yes	No ESV Available
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	20	3	15%	1.00E-07	4.00E-07	9.00E-07	---	1.00E-07	NESV	---	---	Yes	No ESV Available
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	20	4	20%	6.90E-08	1.33E-07	2.80E-07	---	1.40E-08	NESV	---	---	Yes	No ESV Available
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	1746-01-6	20	4	20%	6.80E-08	6.15E-07	1.84E-06	---	1.19E-07	NESV	---	---	Yes	No ESV Available
Octachlorodibenzofuran	39001-02-0	20	6	30%	1.22E-06	3.07E-06	7.38E-06	2.82E-06	3.81E-06	NESV	---	---	No	95% UCL < Background
Octachlorodibenzo-P-Dioxin	3268-87-9	20	15	75%	3.74E-06	1.78E-05	3.35E-05	2.52E-05	7.17E-05	NESV	---	---	No	95% UCL < Background
TEC _{2,3,7,8-TCDD-Bird-1/2MDL}	---	20	17	85%	9.96E-08	3.92E-07	2.03E-06	7.39E-07	---	2.08E-07	8	9.8	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-MDL}	---	20	17	85%	5.21E-07	1.10E-06	3.05E-06	1.27E-06	---	2.08E-07	17	14.7	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Bird-Zero}	---	20	17	85%	2.73E-09	3.02E-07	1.84E-06	7.16E-07	---	2.08E-07	5	8.8	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-1/2MDL}	---	20	17	85%	7.24E-08	3.79E-07	1.95E-06	7.50E-07	---	2.90E-07	5	6.7	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-MDL}	---	20	17	85%	3.43E-07	7.27E-07	2.18E-06	1.06E-06	---	2.90E-07	17	7.5	Yes	[Maximum] > ESV
TEC _{2,3,7,8-TCDD-Mammal-Zero}	---	20	17	85%	8.62E-09	3.18E-07	1.84E-06	7.13E-07	---	2.90E-07	4	6.3	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Total HMW PAHs - 1/2MDL	---	82	54	66%	0.0144	0.3992	2.499	0.7333	0.1591	1.1	5	2.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	82	54	66%	0.0179	0.411	2.499	0.7381	0.1591	1.1	5	2.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	82	54	66%	0.0109	0.3874	2.499	0.7337	0.1591	1.1	5	2.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzaldehyde	100-52-7	82	10	12%	0.0052	0.0106	0.044	0.0081	0.0237	NESV	---	---	No	95% UCL < Background
Bis(2-Ethylhexyl) Phthalate	117-81-7	82	13	16%	0.016	0.132	0.35	0.049	0.033	0.02	12	17.5	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	82	4	5%	0.011	0.129	0.48	---	0.01	0.011	3	43.6	No	< 5% Detected

Table E-6
Refined Ecological Screening for Bulk Soil (0-2 feet)
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentration s > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Cyclohexane	110-82-7	17	1	6%	0.001	0.001	0.001	---	---	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	17	10	59%	0.002	0.08	0.4	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	17	1	6%	0.0015	0.0015	0.0015	---	---	NESV	---	---	Yes	No ESV Available
M,P-Xylene	179601-23-1	17	1	6%	0.00051	0.00051	0.00051	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List
TEC: Toxic Equivalency Concentration

Table E-7
Refined Ecological Screening for Bulk Soil (0-2 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	38	38	100%	6070	8796	10800	9480	8991	NESV	---	---	No	pH > 5.5
Arsenic	7440-38-2	38	38	100%	1.9	4.5	8.2	4.9	4.5	6.8	1	1.2	Yes	[Maximum] > ESV
Barium	7440-39-3	38	38	100%	67.6	130.7	236	158.1	141.7	110	24	2.1	Yes	[Maximum] > ESV
Cobalt	7440-48-4	38	38	100%	4	6	8	6	6	13	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	38	38	100%	8.9	15.2	22.7	17.1	14.9	14	25	1.6	Yes	[Maximum] > ESV
Iron	7439-89-6	38	38	100%	9160	13882	17600	14681	13920	NESV	---	---	No	pH > 5
Lead	7439-92-1	38	38	100%	6.3	9.1	13.6	10.1	9.9	11	4	1.2	Yes	[Maximum] > ESV
Manganese	7439-96-5	38	38	100%	76.4	300.8	467	362.6	341.5	220	32	2.1	Yes	[Maximum] > ESV
Nickel	7440-02-0	38	38	100%	9.2	12.6	18.1	14.2	12.2	38	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	38	1	3%	0.65	0.65	0.65	---	0.15	0.52	1	1.3	No	< 5% Detected
Vanadium	7440-62-2	38	38	100%	7.6	13.5	17.3	14.4	14.9	4.7	38	3.7	No	95% UCL < Background
Zinc	7440-66-6	38	38	100%	27.7	42.1	56.3	47	41.9	46	12	1.2	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	38	25	66%	0.03	0.77	3.7	0.88	0.06	0.098	19	37.8	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	38	38	100%	7410	18067	35100	21120	6732	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	38	38	100%	7060	10582	14800	11399	8555	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	38	38	100%	436	885	1290	1036	1095	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	38	22	58%	42.1	108.5	249	117.4	41.6	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Naphthalene	91-20-3	38	6	16%	0.04	0.28	0.81	---	---	0.0994	3	8.1	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	38	27	71%	0.1045	0.737	3.399	1.3219	0.0753	1.1	5	3.1	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	38	27	71%	0.166	0.766	3.399	1.427	0.075	1.1	5	3.1	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	38	27	71%	0.027	0.708	3.399	1.306	0.075	1.1	5	3.1	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzaldehyde	100-52-7	38	4	11%	0.031	0.052	0.088	0.039	0.007	NESV	---	---	Yes	No ESV Available
Caprolactam	105-60-2	38	2	5%	0.042	0.044	0.046	---	0.016	NESV	---	---	Yes	No ESV Available
Di-N-Butyl Phthalate	84-74-2	38	4	11%	0.014	0.022	0.034	---	0.011	0.011	4	3.1	Yes	[Maximum] > ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Cyclohexane	110-82-7	19	18	95%	0.00047	0.00235	0.005	---	---	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	19	3	16%	0.011	0.324	0.6	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	19	19	100%	0.00058	0.00422	0.011	---	---	NESV	---	---	Yes	No ESV Available
M,P-Xylene	179601-23-1	19	19	100%	0.00031	0.00144	0.0033	---	---	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	19	18	95%	0.00011	0.00048	0.0011	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-8a
Refined Ecological Screening for Bulk Soil Using Upper RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	86	86	9014	21350	39465	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	86	75	0.141	0.796	11.0	0.27	48	40.8	Yes	[Maximum] > ESV
Arsenic	7440-38-2	86	86	4.41	7.02	35.6	6.8	25	5.2	Yes	[Maximum] > ESV
Barium	7440-39-3	86	86	61.8	159	330	110	73	3	Yes	[Maximum] > ESV
Beryllium	7440-41-7	86	86	0.420	0.882	3.93	2.5	1	1.6	Yes	[Maximum] > ESV
Cadmium	7440-43-9	86	86	0.057	0.325	1.84	0.27	38	6.8	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	86	86	14.3	23.1	58.6	26	20	2.3	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	86	86	0.382	0.619	1.57	0.34	86	4.6	No	See text
Chromium, Trivalent	16065-83-1	86	86	13.9	22.5	57.0	26	19	2.2	No	See text
Cobalt	7440-48-4	86	86	5.59	6.64	14.0	13	1	1.1	Yes	[Maximum] > ESV
Copper	7440-50-8	86	86	14.8	69.5	996	14	86	71.1	Yes	[Maximum] > ESV
Iron	7439-89-6	86	86	14373	19400	68967	NESV	---	---	No	pH > 5
Lead	7439-92-1	86	86	8.89	46.5	603	11	82	54.8	Yes	[Maximum] > ESV
Manganese	7439-96-5	86	86	360	522	902	220	86	4.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	86	60	0.020	0.037	0.140	0.013	60	10.7	Yes	[Maximum] > ESV
Nickel	7440-02-0	86	86	14.4	33.4	163	38	25	4.3	Yes	[Maximum] > ESV
Selenium	7782-49-2	86	86	0.214	1.74	16.0	0.52	74	30.7	Yes	[Maximum] > ESV
Thallium	7440-28-0	86	86	0.064	0.133	0.457	0.05	86	9.1	Yes	[Maximum] > ESV
Vanadium	7440-62-2	86	86	8.88	20.1	59.5	4.7	86	12.7	Yes	[Maximum] > ESV
Zinc	7440-66-6	86	86	46.8	125	1939	46	86	42.1	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	86	84	0.023	1.18	25.5	0.098	78	260.4	Yes	[Maximum] > ESV
Fluoride	16984-48-8	86	86	21.4	333	1218	120	49	10.2	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	86	86	2886	21316	50575	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	86	86	6979	10849	13590	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	86	86	771	1549	3272	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	86	82	55.8	1332	11767	NESV	---	---	No	Essential Nutrient
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1248 (Aroclor 1248) ¹	12672-29-6	86	1	0.200	0.200	0.200	0.0073	1	27.4	Yes	[Maximum] > ESV
PCB-1254 (Aroclor 1254)	11097-69-1	86	14	0.110	0.426	1.73	0.041	14	42.2	Yes	[Maximum] > ESV
Polychlorinated Biphenyl (PCBs)	1336-36-3	86	15	0.110	0.430	1.73	0.000332	15	5207.2	Yes	[Maximum] > ESV

Table E-8a
Refined Ecological Screening for Bulk Soil Using Upper RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	86	72	0.003	1.04	39.9	3.24	4	12.3	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	86	84	0.014	4.66	199	0.25	43	796.1	Yes	[Maximum] > ESV
Anthracene	120-12-7	86	80	0.027	7.98	274	6.8	10	40.2	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	86	86	0.036	29.0	754	10	23	75.4	Yes	[Maximum] > ESV
Fluorene	86-73-7	86	83	0.011	3.85	164	3.7	6	44.2	Yes	[Maximum] > ESV
Naphthalene	91-20-3	86	76	0.005	2.05	87.6	0.0994	34	881.5	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	86	86	0.020	25.6	801	5.5	22	145.7	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	86	86	0.118	73.3	2339	29	20	80.6	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	86	86	0.181	73.3	2339	29	20	80.6	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	86	86	0.056	73.3	2339	29	20	80.6	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	86	85	0.030	16.7	401	62	4	6.5	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	86	84	0.139	16.4	405	0.73	61	554.9	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	86	86	0.035	20.0	432	18	16	24	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	86	85	0.040	14.2	354	25	9	14.1	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	86	85	0.025	7.92	214	71	1	3	Yes	[Maximum] > ESV
Chrysene	218-01-9	86	86	0.036	18.6	407	3.1	46	131.4	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	86	82	0.034	3.98	83.6	14	4	6	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	86	84	0.110	12.9	275	71	4	3.9	Yes	[Maximum] > ESV
Pyrene	129-00-0	86	86	0.029	27.9	708	10	21	70.8	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	86	86	0.222	133	3263	1.1	84	2966.4	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	86	86	0.313	133	3263	1.1	84	2966.4	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	86	86	0.130	133	3263	1.1	84	2966.4	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	86	86	0.269	185	5094	NESV	---	---	No	No ESV Available
Total PAHs - MDL	---	86	86	0.417	185	5094	NESV	---	---	No	No ESV Available
Total PAHs - Zero	---	86	86	0.121	185	5094	NESV	---	---	No	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
2,4-Dimethylphenol ¹	105-67-9	86	2	0.250	0.480	0.710	0.01	2	71	Yes	[Maximum] > ESV
3- And 4- Methylphenol (Total) ¹	106445	62	2	0.011	0.014	0.017	NESV	---	---	No	No ESV Available
Benzaldehyde ¹	100-52-7	86	8	0.007	0.026	0.051	NESV	---	---	No	No ESV Available
Benzyl Butyl Phthalate	85-68-7	86	16	0.013	0.233	1.40	90	0	<1	No	[Maximum] < ESV
Bis(2-Ethylhexyl) Phthalate ¹	117-81-7	86	16	0.014	0.115	0.810	0.02	15	40.5	Yes	[Maximum] > ESV
Carbazole	86-74-8	86	84	0.021	4.09	137	79	1	1.7	Yes	[Maximum] > ESV
Dibenzofuran	132-64-9	86	78	0.006	2.30	93.5	6.1	4	15.3	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate ¹	84-74-2	86	22	0.011	0.025	0.067	0.011	20	6.1	Yes	[Maximum] > ESV

Notes:

¹ No RSD adjustment or UCL substitution due to no detected results in replicate samples. Measured results used instead.

---, Not applicable.

COPEC: Constituent of Potential Ecological Concern

ESV, Ecological Screening Value

HMW, High molecular weight

HQ, Hazard Quotient

HQ_{Max}, Maximum hazard quotient,

LMW, Low molecular weight

[Maximum]: Maximum concentration

mg/kg, milligrams per kilograms

MDL: Method Detection Limit

NESV: No Ecological Screening Value

PAH, Polycyclic Aromatic Hydrocarbon

PCB, Polychlorinated Biphenyl

SVOC, Semi-Volatile Organic Compound

TAL: Target Analyte List

TCL: Target Compound List

TEC: Toxic Equivalency Concentration

Table E-8b
Refined Ecological Screening for Bulk Soil Using Measured Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	86	86	8620	20499	37700	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	86	75	0.092	0.588	8.60	0.27	30	31.9	Yes	[Maximum] > ESV
Arsenic	7440-38-2	86	86	4.10	6.39	31.3	6.8	15	4.6	Yes	[Maximum] > ESV
Barium	7440-39-3	86	86	59.4	150	302	110	69	2.7	Yes	[Maximum] > ESV
Beryllium	7440-41-7	86	86	0.400	0.839	3.70	2.5	1	1.5	Yes	[Maximum] > ESV
Cadmium	7440-43-9	86	86	0.054	0.291	1.60	0.27	30	5.9	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	86	86	12.9	21.3	54.4	26	17	2.1	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	86	86	0.345	0.571	1.46	0.34	86	4.3	No	See text
Chromium, Trivalent	16065-83-1	86	86	12.6	20.7	52.9	26	17	2	No	See text
Cobalt	7440-48-4	86	86	5.40	6.48	13.5	13	1	1	Yes	[Maximum] > ESV
Copper	7440-50-8	86	86	14.1	63.7	887	14	86	63.4	Yes	[Maximum] > ESV
Iron	7439-89-6	86	86	13900	18893	66700	NESV	---	---	No	pH > 5
Lead	7439-92-1	86	86	8.60	35.2	406	11	81	36.9	Yes	[Maximum] > ESV
Manganese	7439-96-5	86	86	341	494	902	220	86	4.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	86	60	0.013	0.028	0.140	0.013	59	10.7	Yes	[Maximum] > ESV
Nickel	7440-02-0	86	86	13.4	30.1	142	38	21	3.7	Yes	[Maximum] > ESV
Selenium	7782-49-2	86	86	0.180	1.48	13.3	0.52	69	25.6	Yes	[Maximum] > ESV
Thallium	7440-28-0	86	86	0.060	0.122	0.400	0.05	86	8	Yes	[Maximum] > ESV
Vanadium	7440-62-2	86	86	8.60	19.0	54.5	4.7	86	11.6	Yes	[Maximum] > ESV
Zinc	7440-66-6	86	86	44.4	114	1720	46	84	37.4	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	86	84	0.017	0.928	18.2	0.098	76	185.7	Yes	[Maximum] > ESV
Fluoride	16984-48-8	86	86	16.6	272	976	120	47	8.1	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	86	86	2886	19082	45700	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	86	86	6830	10612	13300	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	86	86	721	1464	3080	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	86	82	46.1	1084	9000	NESV	---	---	No	Essential Nutrient
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1248 (Aroclor 1248)	12672-29-6	86	1	0.200	0.200	0.200	0.0073	1	27.4	Yes	[Maximum] > ESV
PCB-1254 (Aroclor 1254)	11097-69-1	86	14	0.046	0.310	1.73	0.041	14	42.2	Yes	[Maximum] > ESV
Polychlorinated Biphenyl (PCBs)	1336-36-3	86	15	0.046	0.303	1.73	0.000332	15	5207.2	Yes	[Maximum] > ESV

Table E-8b
Refined Ecological Screening for Bulk Soil Using Measured Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	86	72	0.003	0.706	27.0	3.24	4	8.3	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	86	84	0.008	2.78	110	0.25	38	440	Yes	[Maximum] > ESV
Anthracene	120-12-7	86	80	0.027	4.86	150	6.8	8	22.1	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	86	86	0.021	19.1	440	10	17	44	Yes	[Maximum] > ESV
Fluorene	86-73-7	86	83	0.010	2.37	94.0	3.7	6	25.4	Yes	[Maximum] > ESV
Naphthalene	91-20-3	86	76	0.005	1.55	68.0	0.0994	27	684.1	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	86	86	0.011	16.3	450	5.5	20	81.8	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	86	86	0.068	46.9	1342	29	16	46.3	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	86	86	0.104	46.9	1342	29	16	46.3	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	86	86	0.032	46.8	1342	29	16	46.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	86	85	0.018	11.2	240	62	4	3.9	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	86	84	0.084	11.1	240	0.73	56	328.8	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	86	86	0.022	14.2	270	18	13	15	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	86	85	0.025	9.94	220	25	6	8.8	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	86	85	0.015	5.45	130	71	1	1.8	Yes	[Maximum] > ESV
Chrysene	218-01-9	86	86	0.022	12.9	250	3.1	38	80.6	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	86	82	0.021	2.70	51.0	14	4	3.6	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	86	84	0.076	9.07	170	71	3	2.4	Yes	[Maximum] > ESV
Pyrene	129-00-0	86	86	0.017	18.2	410	10	18	41	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	86	86	0.135	93.5	1981	1.1	80	1800.9	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	86	86	0.190	93.5	1981	1.1	80	1800.9	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	86	86	0.079	93.5	1981	1.1	80	1800.9	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	86	86	0.160	126	3026	NESV	---	---	No	No ESV Available
Total PAHs - MDL	---	86	86	0.248	126	3026	NESV	---	---	No	No ESV Available
Total PAHs - Zero	---	86	86	0.072	126	3026	NESV	---	---	No	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
2,4-Dimethylphenol	105-67-9	86	2	0.250	0.480	0.710	0.01	2	71	Yes	[Maximum] > ESV
3- And 4- Methylphenol (Total)	106445	62	2	0.011	0.014	0.017	NESV	---	---	No	No ESV Available
Benzaldehyde	100-52-7	86	8	0.007	0.026	0.051	NESV	---	---	No	No ESV Available
Benzyl Butyl Phthalate	85-68-7	86	16	0.010	0.230	1.40	90	0	<1	No	[Maximum] < ESV
Bis(2-Ethylhexyl) Phthalate	117-81-7	86	16	0.014	0.115	0.810	0.02	15	40.5	Yes	[Maximum] > ESV
Dibenzofuran	132-64-9	86	78	0.006	1.44	55.0	6.1	4	9	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	86	22	0.011	0.025	0.067	0.011	20	6.1	Yes	[Maximum] > ESV

Notes:

¹ No UCL substitution due to no detected results in replicate samples. Measured results used instead.

---, Not applicable.

COPEC: Constituent of Potential Ecological Concern

ESV, Ecological Screening Value

HMW, High molecular weight

HQ, Hazard Quotient

HQ_{Max}, Maximum hazard quotient,

LMW, Low molecular weight

[Maximum]: Maximum concentration

mg/kg, milligrams per kilograms

MDL: Method Detection Limit

NESV: No Ecological Screening Value

PAH, Polycyclic Aromatic Hydrocarbon

PCB, Polychlorinated Biphenyl

SVOC, Semi-Volatile Organic Compound

TAL: Target Analyte List

TCL: Target Compound List

TEC: Toxic Equivalency Concentration

Table E-8c
Refined Ecological Screening for Bulk Soil Using Lower RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)											
Aluminum	7429-90-5	86	86	8226	19649	35935	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	86	75	0.027	0.379	6.19	0.27	23	22.9	Yes	[Maximum] > ESV
Arsenic	7440-38-2	86	86	3.62	5.76	27.0	6.8	12	4	Yes	[Maximum] > ESV
Barium	7440-39-3	86	86	57.0	141	281	110	58	2.6	Yes	[Maximum] > ESV
Beryllium	7440-41-7	86	86	0.380	0.796	3.47	2.5	1	1.4	Yes	[Maximum] > ESV
Cadmium	7440-43-9	86	86	0.051	0.257	1.36	0.27	23	5	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	86	86	11.5	19.5	50.2	26	14	1.9	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	86	86	0.309	0.522	1.34	0.34	84	4	No	See text
Chromium, Trivalent	16065-83-1	86	86	11.2	19.0	48.8	26	12	1.9	No	See text
Cobalt	7440-48-4	86	86	5.21	6.31	13.0	13	1	1	Yes	[Maximum] > ESV
Copper	7440-50-8	86	86	13.4	57.9	778	14	82	55.6	Yes	[Maximum] > ESV
Iron	7439-89-6	86	86	13427	18386	64433	NESV	---	---	No	pH > 5
Lead	7439-92-1	86	86	6.18	24.0	253	11	59	23	Yes	[Maximum] > ESV
Manganese	7439-96-5	86	86	322	465	902	220	86	4.1	Yes	[Maximum] > ESV
Mercury	7439-97-6	86	60	0.006	0.018	0.140	0.013	36	10.7	Yes	[Maximum] > ESV
Nickel	7440-02-0	86	86	11.5	26.9	121	38	17	3.2	Yes	[Maximum] > ESV
Selenium	7782-49-2	86	86	0.146	1.21	10.6	0.52	67	20.5	Yes	[Maximum] > ESV
Thallium	7440-28-0	86	86	0.056	0.110	0.387	0.05	86	7.7	Yes	[Maximum] > ESV
Vanadium	7440-62-2	86	86	8.32	17.8	52.3	4.7	86	11.1	Yes	[Maximum] > ESV
Zinc	7440-66-6	86	86	42.0	103	1501	46	77	32.6	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)											
Cyanide	57-12-5	86	84	0.011	0.671	10.9	0.098	62	111.1	Yes	[Maximum] > ESV
Fluoride	16984-48-8	86	86	11.8	212	781	120	43	6.5	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)											
Calcium	7440-70-2	86	86	2886	16847	40825	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	86	86	6681	10374	13010	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	86	86	671	1379	3069	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	86	82	36.4	836	6298	NESV	---	---	No	Essential Nutrient
Polychlorinated Biphenyls (PCBs) (mg/kg)											
PCB-1248 (Aroclor 1248) ¹	12672-29-6	86	1	0.200	0.200	0.200	0.0073	1	27.4	Yes	[Maximum] > ESV
PCB-1254 (Aroclor 1254)	11097-69-1	86	14	-0.106856201	0.194	1.73	0.041	7	42.2	Yes	[Maximum] > ESV
Polychlorinated Biphenyl (PCBs)	1336-36-3	86	15	-0.106856201	0.176	1.73	0.000332	7	5207.2	Yes	[Maximum] > ESV

Table E-8c
Refined Ecological Screening for Bulk Soil Using Lower RSD-Adjusted Results (0-2 feet)
Operational Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)											
2-Methylnaphthalene	91-57-6	86	72	0.002	0.373	14.1	3.24	2	4.4	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	86	84	0.002	0.897	22.0	0.25	20	88.2	Yes	[Maximum] > ESV
Anthracene	120-12-7	86	80	0.005	1.74	44.3	6.8	5	6.5	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	86	86	0.006	9.09	188	10	15	18.8	Yes	[Maximum] > ESV
Fluorene	86-73-7	86	83	0.002	0.897	24.3	3.7	4	6.6	Yes	[Maximum] > ESV
Naphthalene	91-20-3	86	76	0.005	1.05	48.4	0.0994	24	486.7	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	86	86	0.002	6.94	186	5.5	15	33.9	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	86	86	0.017	20.4	474	29	11	16.4	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	86	86	0.027	20.4	475	29	11	16.4	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	86	86	0.008	20.4	474	29	11	16.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	86	85	0.006	5.67	83.0	62	3	1.3	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	86	84	0.026	5.79	95.1	0.73	47	130.3	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	86	86	0.009	8.49	108	18	10	6	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	86	85	0.010	5.67	86.3	25	4	3.5	Yes	[Maximum] > ESV
Chrysene	218-01-9	86	86	0.008	7.17	103	3.1	28	33.1	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	86	82	0.008	1.41	18.4	14	3	1.3	Yes	[Maximum] > ESV
Pyrene	129-00-0	86	86	0.005	8.47	176	10	15	17.6	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	86	86	0.047	53.7	828	1.1	72	752.7	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	86	86	0.067	53.7	828	1.1	72	752.7	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	86	86	0.028	53.7	828	1.1	72	752.7	Yes	[Maximum] > ESV
Total PAHs - 1/2MDL	---	86	86	0.051	65.9	1205	NESV	---	---	No	No ESV Available
Total PAHs - MDL	---	86	86	0.078	65.9	1205	NESV	---	---	No	No ESV Available
Total PAHs - Zero	---	86	86	0.023	65.8	1205	NESV	---	---	No	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)											
2,4-Dimethylphenol ¹	105-67-9	86	2	0.250	0.480	0.710	0.01	2	71	Yes	[Maximum] > ESV
3- And 4- Methylphenol (Total) ¹	106445	62	2	0.011	0.014	0.017	NESV	---	---	No	No ESV Available
Benzaldehyde ¹	100-52-7	86	8	0.007	0.026	0.051	NESV	---	---	No	No ESV Available
Benzyl Butyl Phthalate	85-68-7	86	16	0.007	0.227	1.40	90	0	<1	No	[Maximum] < ESV
Bis(2-Ethylhexyl) Phthalate ¹	117-81-7	86	16	0.014	0.115	0.810	0.02	15	40.5	Yes	[Maximum] > ESV
Dibenzofuran	132-64-9	86	78	0.002	0.584	16.5	6.1	2	2.7	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate ¹	84-74-2	86	22	0.011	0.025	0.067	0.011	20	6.1	Yes	[Maximum] > ESV

Notes:

¹, No RSD adjustment or UCL substitution due to no detected results in replicate samples. Measured results used instead.

---, Not applicable.

COPEC: Constituent of Potential Ecological Concern

ESV, Ecological Screening Value

HMW, High molecular weight

HQ, Hazard Quotient

HQ_{Max}, Maximum hazard quotient,

LMW, Low molecular weight

[Maximum]: Maximum concentration

mg/kg, milligrams per kilograms

MDL: Method Detection Limit

NESV: No Ecological Screening Value

PAH, Polycyclic Aromatic Hydrocarbon

PCB, Polychlorinated Biphenyl

SVOC, Semi-Volatile Organic Compound

TAL: Target Analyte List

TCL: Target Compound List

TEC: Toxic Equivalency Concentration

Table E-9
Refined Ecological Screening for Bulk Soil (0-2 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	42	42	100%	6290	35213	123000	50414	10794	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	42	10	24%	0.43	1.45	2.6	0.93	0.13	0.27	10	9.6	Yes	[Maximum] > ESV
Arsenic	7440-38-2	42	42	100%	2.4	11	34.1	13.5	3.9	6.8	29	5	Yes	[Maximum] > ESV
Barium	7440-39-3	42	42	100%	19.6	211.6	1560	244.6	154.9	110	28	14.2	Yes	[Maximum] > ESV
Beryllium	7440-41-7	42	42	100%	0.31	2.71	17.2	3.99	0.51	2.5	12	6.9	Yes	[Maximum] > ESV
Cadmium	7440-43-9	42	36	86%	0.29	2.48	9.6	3.62	0.15	0.27	36	35.6	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	46	46	100%	5.6	21.7	53	28.7	9.1	26	13	2	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	44	39	89%	0.19	0.55	1.38	0.69	---	0.34	29	4.1	No	See Text
Chromium, Trivalent	16065-83-1	44	44	100%	5.52	20.01	50.12	25.44	---	26	11	1.9	No	See Text
Cobalt	7440-48-4	42	42	100%	1.2	6.6	27.4	9.5	5.8	13	3	2.1	Yes	[Maximum] > ESV
Copper	7440-50-8	42	42	100%	6.4	28.3	83.6	44.3	11.6	14	30	6	Yes	[Maximum] > ESV
Iron	7439-89-6	42	42	100%	1330	9661	23600	9375	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	42	42	100%	6.4	48	238	110.7	10.4	11	36	21.6	Yes	[Maximum] > ESV
Manganese	7439-96-5	42	42	100%	12.8	172.2	762	211.1	464.9	220	12	3.5	No	95% UCL < Background
Mercury	7439-97-6	42	32	76%	0.012	0.035	0.12	0.063	0.016	0.013	31	9.2	Yes	[Maximum] > ESV
Nickel	7440-02-0	42	42	100%	10.3	188.2	1250	359.8	11.1	38	36	32.9	Yes	[Maximum] > ESV
Selenium	7782-49-2	42	26	62%	0.34	1.19	3.4	1.83	0.13	0.52	22	6.5	Yes	[Maximum] > ESV
Thallium	7440-28-0	42	35	83%	0.14	0.95	4.6	1.89	0.06	0.05	35	92	Yes	[Maximum] > ESV
Vanadium	7440-62-2	42	42	100%	6.1	62.6	348	110.4	11.2	4.7	42	74	Yes	[Maximum] > ESV
Zinc	7440-66-6	42	42	100%	29.2	216.1	871	342.4	47.7	46	38	18.9	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	42	41	98%	0.078	13.598	137	41.152	0.141	0.098	38	1398	Yes	[Maximum] > ESV
Fluoride	16984-48-8	42	42	100%	2.42	86.44	306	146.65	1.17	120	12	2.6	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	42	42	100%	427	21195	106000	33122	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	42	42	100%	442	6561	21800	6051	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	42	42	100%	101	868	3200	853	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	42	38	90%	28.3	406	2390	862.8	32.7	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
2-Methylnaphthalene	91-57-6	40	30	75%	0.0055	0.963	6.9	2.1586	0.0011	3.24	3	2.1	Yes	[Maximum] > ESV
Acenaphthene	83-32-9	41	40	98%	0.016	13.475	190	81.884	0.001	0.25	28	760	Yes	[Maximum] > ESV
Anthracene	120-12-7	41	40	98%	0.049	25.116	250	113.001	0.002	6.8	16	36.8	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	41	40	98%	0.029	309.111	3700	2235.36	0.023	10	27	370	Yes	[Maximum] > ESV
Fluorene	86-73-7	41	33	80%	0.012	8.238	82	25.694	0.001	3.7	11	22.2	Yes	[Maximum] > ESV
Naphthalene	91-20-3	41	28	68%	0.028	1.628	12	3.65	0.001	0.0994	23	120.7	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	41	40	98%	0.23	101.33	1300	285.2	0.01	5.5	25	236.4	Yes	[Maximum] > ESV
Total LMW PAHs - 1/2MDL	---	41	40	98%	1.26675	459.17222	5561.4	2317.6166	0.04218	29	23	191.8	Yes	[Maximum] > ESV
Total LMW PAHs - MDL	---	41	40	98%	1.2855	460.555	5593.9	2327.8441	0.0422	29	23	192.9	Yes	[Maximum] > ESV
Total LMW PAHs - Zero	---	41	40	98%	1.248	457.789	5528.9	2307.398	0.042	29	23	190.7	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	41	39	95%	0.95	202.76	3100	1269.12	0.02	62	14	50	Yes	[Maximum] > ESV
Benzo(A)Anthracene	56-55-3	41	39	95%	0.66	184.73	2700	1119.24	0.01	0.73	38	3698.6	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	41	39	95%	1.6	238.8	3000	1004.1	---	18	25	166.7	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	41	39	95%	1.2	152	2200	699.3	---	25	18	88	Yes	[Maximum] > ESV
Benzo(K)Fluoranthene	207-08-9	41	39	95%	1.2	144.9	2400	720.2	---	71	8	33.8	Yes	[Maximum] > ESV
Chrysene	218-01-9	41	40	98%	0.011	208.761	2800	1166.308	0.023	3.1	35	903.2	Yes	[Maximum] > ESV
Dibenz(A,H)Anthracene	53-70-3	41	39	95%	0.35	50.01	740	236.63	---	14	13	52.9	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	41	39	95%	1.1	141.7	2000	643	---	71	9	28.2	Yes	[Maximum] > ESV
Pyrene	129-00-0	41	40	98%	0.058	272.596	3200	1964.634	0.018	10	26	320	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	41	41	100%	0.0865	1530.144	22140	13432.84	0.1591	1.1	39	20127.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	41	41	100%	0.162	1530.148	22140	9208.326	0.159	1.1	39	20127.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	41	41	100%	0.011	1530.14	22140	13432.84	0.159	1.1	39	20127.3	Yes	[Maximum] > ESV

Table E-9
Refined Ecological Screening for Bulk Soil (0-2 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzyl Butyl Phthalate	85-68-7	40	1	3%	0.55	0.55	0.55	---	0.02	90	0	<1	No	< 5% Detected
Bis(2-Ethylhexyl) Phthalate	117-81-7	40	4	10%	0.17	1.62	5.9	---	0.03	0.02	4	295	Yes	[Maximum] > ESV
Carbazole	86-74-8	40	38	95%	0.0043	12.855	190	53.7367	0.0031	79	1	2.4	Yes	[Maximum] > ESV
Dibenzofuran	132-64-9	40	37	93%	0.019	2.566	28	7.704	0.001	6.1	5	4.6	Yes	[Maximum] > ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Cyclohexane	110-82-7	9	3	33%	0.0027	0.0048	0.0086	---	---	NESV	---	---	Yes	No ESV Available
Isopropylbenzene (Cumene)	98-82-8	9	2	22%	0.0002	0.0004	0.0005	---	---	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	9	5	56%	0.0022	0.0044	0.0065	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	9	3	33%	0.0052	0.0086	0.015	---	---	NESV	---	---	Yes	No ESV Available
M,P-Xylene	179601-23-1	9	5	56%	0.00016	0.00359	0.0091	---	---	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	9	3	33%	0.00094	0.00195	0.0032	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-10
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	22	22	100%	7520	37392	112000	50414	10794	26000	11	4.3	No	pH > 5.5
Antimony	7440-36-0	22	7	32%	0.43	1.45	2.6	0.93	0.13	2	2	1.3	Yes	[Maximum] > ESV
Arsenic	7440-38-2	22	22	100%	2.5	10.6	26.4	13.5	3.9	9.79	9	2.7	Yes	[Maximum] > ESV
Barium	7440-39-3	22	22	100%	19.6	197.4	539	244.6	154.9	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	22	22	100%	0.34	2.62	17.2	3.99	0.51	NESV	---	---	Yes	No ESV Available
Cadmium	7440-43-9	22	21	95%	0.29	2.56	8.3	3.62	0.15	0.99	16	8.4	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	24	24	100%	7.2	24.2	53	28.7	9.1	43.4	2	1.2	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	22	20	91%	0.21	0.62	1.27	0.69	---	NESV	---	---	No	See Text
Chromium, Trivalent	16065-83-1	22	22	100%	6.805	21.509	46.229	25.437	---	NESV	---	---	No	See Text
Copper	7440-50-8	22	22	100%	6.4	36.3	83.6	44.3	11.6	31.6	11	2.6	Yes	[Maximum] > ESV
Lead	7439-92-1	22	22	100%	8.3	52.7	238	110.7	10.4	35.8	7	6.6	Yes	[Maximum] > ESV
Manganese	7439-96-5	22	22	100%	12.8	139.4	479	211.1	464.9	460	1	1	No	95% UCL < Background
Nickel	7440-02-0	22	22	100%	17.9	240	1250	359.8	11.1	22.7	21	55.1	Yes	[Maximum] > ESV
Selenium	7782-49-2	22	16	73%	0.34	1.23	3.4	1.83	0.13	2	3	1.7	Yes	[Maximum] > ESV
Silver	7440-22-4	22	2	9%	1	1	1	---	---	0.5	2	2	Yes	[Maximum] > ESV
Thallium	7440-28-0	22	19	86%	0.14	0.85	4.6	1.89	0.06	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	22	22	100%	13.3	76.6	348	110.4	11.2	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	22	22	100%	42.2	260.4	871	342.4	47.7	121	19	7.2	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	22	22	100%	0.096	12.525	137	41.152	0.141	0.1	21	1370	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	22	22	100%	427	20180	106000	33122	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	22	22	100%	442	4847	11800	6051	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	22	22	100%	101	701	1900	853	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	22	21	95%	28.4	385	2140	862.8	32.7	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
2-Methylnaphthalene	91-57-6	22	18	82%	0.017	1.132	6.9	2.159	0.001	NESV	---	---	Yes	No ESV Available
Acenaphthene	83-32-9	22	22	100%	0.031	18.535	190	81.884	0.001	NESV	---	---	Yes	No ESV Available
Acenaphthylene	208-96-8	22	6	27%	0.033	0.548	1.2	0.32	0.001	NESV	---	---	Yes	No ESV Available
Anthracene	120-12-7	22	22	100%	0.049	29.153	250	113.001	0.002	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	22	22	100%	0.029	370.351	3700	2235.36	0.023	NESV	---	---	Yes	No ESV Available
Fluorene	86-73-7	22	19	86%	0.012	9.478	82	25.694	0.001	NESV	---	---	Yes	No ESV Available
Naphthalene	91-20-3	22	16	73%	0.042	1.863	12	3.65	0.001	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	22	22	100%	0.51	121.99	1300	285.2	0.01	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	22	22	100%	1.963	552.505	5561.4	2317.617	0.042	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	22	22	100%	1.963	554.362	5593.9	2327.844	0.042	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	22	22	100%	1.963	550.648	5528.9	2307.398	0.042	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	22	21	95%	2	285	3100	1269	---	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	22	21	95%	1.7	258.3	2700	1119.2	---	NESV	---	---	Yes	No ESV Available
Benzo(B)Fluoranthene	205-99-2	22	21	95%	5	324	3000	1004	---	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	22	21	95%	2.2	211	2200	699.3	---	NESV	---	---	Yes	No ESV Available
Benzo(K)Fluoranthene	207-08-9	22	21	95%	2.4	206.2	2400	720.2	---	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	22	21	95%	2.3	287.4	2800	1166.3	---	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	22	21	95%	0.61	70.26	740	236.63	---	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	22	21	95%	2.7	197	2000	643	---	NESV	---	---	Yes	No ESV Available

Table E-10
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
Pyrene	129-00-0	22	22	100%	0.058	331.566	3200	1964.634	0.018	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	22	22	100%	0.1355	2087.4157	22140	13432.84	0.1591	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	22	22	100%	0.213	2087.419	22140	9208.326	0.159	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	22	22	100%	0.058	2087.412	22140	13432.84	0.159	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	22	22	100%	1.091	2329.252	24694.5	10217.908	0.168	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	22	22	100%	1.161	2330.88	24727	10227.261	0.168	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	22	22	100%	1.021	2327.625	24662	10208.559	0.168	NESV	---	---	Yes	No ESV Available
2-Methylnaphthalene	91-57-6	8	4	50%	0.018	1.944	6.9	2.159	0.001	NESV	---	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Acetophenone	98-86-2	22	1	5%	0.011	0.011	0.011	---	0.004	NESV	---	---	No	< 5% Detected
Carbazole	86-74-8	22	21	95%	0.11	16.24	190	53.74	---	NESV	---	---	Yes	No ESV Available
Dibenzofuran	132-64-9	22	21	95%	0.036	2.659	28	7.704	0.001	74.97	0	<1	No	[Maximum] < ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-11
Refined Ecological Screening for Surface Water
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Aluminum	7429-90-5	U	2	2	100%	109	4370	8630	---	18	7.1	1	1215.5	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	1	1	100%	4780	4780	4780	---	8	87	1	54.9	Yes	[Maximum] > ESV
Barium	7440-39-3	U	2	2	100%	43.4	138.7	234	---	53.3	4	2	58.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	1	1	100%	26.4	26.4	26.4	---	53.5	4	1	6.6	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	2	1	50%	0.71	0.71	0.71	---	0.13	0.66	1	1.1	Yes	[Maximum] > ESV
Cadmium	7440-43-9	U	2	1	50%	3	3	3	---	0	0.455	1	6.6	Yes	[Maximum] > ESV
Cadmium	7440-43-9	F	1	1	100%	2.5	2.5	2.5	---	0.3	0.426	1	5.9	Yes	[Maximum] > ESV
Copper	7440-50-8	U	2	2	100%	3.8	10.2	16.5	---	2.1	6.609	1	2.5	Yes	[Maximum] > ESV
Copper	7440-50-8	F	1	1	100%	2	2	2	---	1	0.107	1	18.6	Yes	[Maximum] > ESV
Iron	7439-89-6	U	2	1	50%	817	817	817	---	34	1000	0	<1	No	[Maximum] < ESV
Lead	7439-92-1	U	2	1	50%	7.6	7.6	7.6	---	0.2	1.317	1	5.8	Yes	[Maximum] > ESV
Nickel	7440-02-0	U	2	2	100%	1.9	28.9	55.9	---	0.7	29.02	1	1.9	Yes	[Maximum] > ESV
Nickel	7440-02-0	F	1	1	100%	22.1	22.1	22.1	---	0.7	28.93	0	<1	No	[Maximum] < ESV
Vanadium	7440-62-2	U	2	2	100%	6.9	12.4	18	---	0.6	NESV	---	---	Yes	No ESV Available
Zinc	7440-66-6	U	2	1	50%	537	537	537	---	3	66.597	1	8.1	Yes	[Maximum] > ESV
Zinc	7440-66-6	F	1	1	100%	512	512	512	---	4	65.664	1	7.8	Yes	[Maximum] > ESV
Other Inorganic Parameters (µg/L unless otherwise noted)															
Cyanide	57-12-5	U	2	1	50%	7.6	7.6	7.6	---	1	5.2	1	1.5	Yes	[Maximum] > ESV
Fluoride	16984-48-8	U	2	2	100%	2150	12275	22400	---	44	1130	1	19.8	Yes	[Maximum] > ESV
Fluoride	16984-48-8	F	1	1	100%	21500	21500	21500	---	---	1130	1	19	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)															
Benzo(A)Anthracene	56-55-3	U	1	1	100%	3	3	3	---	0.0358	2.227	1	1.3	Yes	[Maximum] > ESV
Benzo(A)Pyrene	50-32-8	U	1	1	100%	3.9	3.9	3.9	---	0.0254	0.957	1	4.1	Yes	[Maximum] > ESV
Benzo(B)Fluoranthene	205-99-2	U	1	1	100%	10	10	10	---	0.0466	0.677	1	14.8	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	U	1	1	100%	3.9	3.9	3.9	---	0.0331	0.439	1	8.9	Yes	[Maximum] > ESV
Chrysene	218-01-9	U	1	1	100%	7.6	7.6	7.6	---	0.0389	2.042	1	3.7	Yes	[Maximum] > ESV
Fluoranthene	206-44-0	U	1	1	100%	9.3	9.3	9.3	---	0.0289	7.109	1	1.3	Yes	[Maximum] > ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	U	1	1	100%	3.1	3.1	3.1	---	0.0409	0.275	1	11.3	Yes	[Maximum] > ESV
Phenanthrene	85-01-8	U	1	1	100%	1.5	1.5	1.5	---	0.0383	19.13	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	U	1	1	100%	7	7	7	---	0.0259	0.025	1	280	Yes	[Maximum] > ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
µg/L: microgram per liter
F: Filtered

Table E-12
Refined Ecological Screening for Bulk Soil (0-2 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	38	38	100%	2360	7567	16100	9034	8991	NESV	---	---	No	pH > 5.5
Antimony	7440-36-0	38	1	3%	0.67	0.67	0.67	---	0.15	0.27	1	2.5	No	< 5% Detected
Barium	7440-39-3	38	38	100%	43.1	431	972	640.1	141.7	110	32	8.8	Yes	[Maximum] > ESV
Cadmium	7440-43-9	38	4	11%	0.95	1.51	2.5	---	0.17	0.27	4	9.3	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	38	38	100%	2.6	9	32.8	11.4	9.9	26	1	1.3	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	24	24	100%	0.07	0.25	0.88	0.42	---	0.34	3	2.6	No	See Text
Chromium, Trivalent	16065-83-1	24	24	100%	2.53	9.12	31.92	15.44	---	26	1	1.2	No	See Text
Cobalt	7440-48-4	38	36	95%	1.2	3.9	7.2	4.3	6	13	0	<1	No	95% UCL < Background
Copper	7440-50-8	38	38	100%	3.3	80.8	694	203	14.9	14	31	49.6	Yes	[Maximum] > ESV
Iron	7439-89-6	38	38	100%	1490	8008	16300	8609	13920	NESV	---	---	No	pH > 5
Lead	7439-92-1	38	38	100%	2.1	14.9	116	34.4	9.9	11	14	10.5	Yes	[Maximum] > ESV
Manganese	7439-96-5	38	38	100%	10.7	86.3	226	111.2	341.5	220	1	1	No	95% UCL < Background
Mercury	7439-97-6	38	32	84%	0.015	0.134	1.4	0.349	0.031	0.013	32	107.7	Yes	[Maximum] > ESV
Nickel	7440-02-0	38	38	100%	4.3	14.4	53.9	19	12.2	38	1	1.4	Yes	[Maximum] > ESV
Selenium	7782-49-2	38	7	18%	0.4	0.8	1.3	0.6	0.1	0.52	6	2.5	Yes	[Maximum] > ESV
Silver	7440-22-4	38	3	8%	1.7	9.8	23.5	---	0.3	2.6	2	9	Yes	[Maximum] > ESV
Thallium	7440-28-0	38	1	3%	0.2	0.2	0.2	---	0.1	0.05	1	4	No	< 5% Detected
Vanadium	7440-62-2	38	38	100%	2.3	10.8	55.7	11.8	14.9	4.7	30	11.9	No	95% UCL < Background
Zinc	7440-66-6	38	38	100%	13.1	81.1	351	115.6	41.9	46	22	7.6	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	38	33	87%	0.038	1.243	16.4	4.429	0.063	0.098	29	167.3	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	38	38	100%	5140	125544	313000	196766	6732	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	38	38	100%	2510	7420	16200	8877	8555	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	38	38	100%	194	678	1790	871	1095	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	38	31	82%	40.3	173.3	434	237	41.6	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Benzo(A)Pyrene	50-32-8	38	31	82%	0.018	0.446	4	0.821	0.008	62	0	<1	No	[Maximum] < ESV
Benzo(A)Anthracene	56-55-3	38	30	79%	0.04	0.2	0.75	0.25	0.01	0.73	1	1	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	38	35	92%	0.163	2.997	19.635	4.502	0.075	1.1	23	17.9	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	38	35	92%	0.221	3.028	20.17	4.547	0.075	1.1	23	18.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	38	35	92%	0.105	2.967	19.1	4.457	0.075	1.1	23	17.4	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
3- And 4- Methylphenol (Total)	106445	32	1	3%	0.13	0.13	0.13	---	---	NESV	---	---	No	< 5% Detected
4-Chloroaniline	106-47-8	38	4	11%	0.019	0.735	1.9	---	0.001	1	1	1.9	Yes	[Maximum] > ESV
Benzaldehyde	100-52-7	38	1	3%	0.038	0.038	0.038	---	0.007	NESV	---	---	No	< 5% Detected
Bis(2-Ethylhexyl) Phthalate	117-81-7	38	5	13%	0.074	0.596	2.2	---	0.027	0.02	5	110	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	38	6	16%	0.019	0.037	0.058	---	0.011	0.011	6	5.3	Yes	[Maximum] > ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Cyclohexane	110-82-7	17	7	41%	0.00066	0.00179	0.0046	---	---	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	17	3	18%	0.0043	0.0071	0.0089	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	17	9	53%	0.00027	0.00229	0.0081	---	---	NESV	---	---	Yes	No ESV Available
M,P-Xylene	179601-23-1	17	11	65%	0.00025	0.00098	0.0033	---	---	NESV	---	---	Yes	No ESV Available
O-Xylene (1,2-Dimethylbenzene)	95-47-6	17	7	41%	0.00011	0.00043	0.0011	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-13
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Barium	7440-39-3	26	26	100%	52.3	552.2	972	640.1	141.7	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	26	17	65%	0.16	0.45	0.79	0.42	0.49	NESV	---	---	No	95% UCL < Background
Cadmium	7440-43-9	26	3	12%	0.95	1.52	2.5	---	0.17	0.99	2	2.5	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	12	12	100%	0.07	0.29	0.88	0.42	---	NESV	---	---	No	See Text
Chromium, Trivalent	16065-83-1	12	12	100%	2.53	10.47	31.92	15.44	---	NESV	---	---	No	See Text
Copper	7440-50-8	26	26	100%	9	87	694	203	15	31.6	17	22	Yes	[Maximum] > ESV
Lead	7439-92-1	26	26	100%	3.4	16.1	116	34.4	9.9	35.8	1	3.2	Yes	[Maximum] > ESV
Mercury	7439-97-6	26	22	85%	0.016	0.135	1.4	0.349	0.031	0.18	3	7.8	Yes	[Maximum] > ESV
Nickel	7440-02-0	26	26	100%	4.4	15.9	53.9	19	12.2	22.7	3	2.4	Yes	[Maximum] > ESV
Silver	7440-22-4	26	2	8%	1.7	12.6	23.5	---	0.3	0.5	2	47	Yes	[Maximum] > ESV
Thallium	7440-28-0	26	1	4%	0.2	0.2	0.2	---	0.1	NESV	---	---	No	< 5% Detected
Vanadium	7440-62-2	26	26	100%	2.3	9.9	26.2	11.8	14.9	NESV	---	---	No	95% UCL < Background
Zinc	7440-66-6	26	26	100%	16.3	89.3	351	115.6	41.9	121	6	2.9	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	26	22	85%	0.12	1.72	16.4	4.43	0.06	0.1	22	164	Yes	[Maximum] > ESV
Cyanide (Free)	STL00131	2	1	50%	0.89	0.89	0.89	---	---	NESV	---	---	Yes	No ESV Available
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	26	26	100%	8540	164548	313000	196766	6732	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	26	26	100%	2510	7771	16200	8877	8555	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	26	26	100%	228	740	1790	871	1095	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	26	22	85%	54.3	204.7	434	237	41.6	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	26	3	12%	0.01	0.01	0.02	---	---	NESV	---	---	Yes	No ESV Available
Anthracene	120-12-7	26	5	19%	0.021	0.041	0.096	0.036	0.002	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	26	25	96%	0.053	0.359	1.3	0.617	0.013	NESV	---	---	Yes	No ESV Available
Fluorene	86-73-7	26	2	8%	0.0087	0.0143	0.02	---	0.0015	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	26	25	96%	0.037	0.155	0.55	0.201	0.009	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	26	25	96%	0.1434	0.6243	2.485	1.0862	0.0309	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	26	25	96%	0.1868	0.7218	3.12	1.2748	0.0309	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	26	25	96%	0.1	0.5	1.9	0.7	---	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	26	23	88%	0.059	0.401	2.8	0.821	0.008	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	26	24	92%	0.042	0.196	0.57	0.246	0.006	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	26	24	92%	0.045	0.48	2.7	0.726	0.012	NESV	---	---	Yes	No ESV Available
Benzo(K)Fluoranthene	207-08-9	26	24	92%	0.022	0.171	0.64	0.234	0.005	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	26	25	96%	0.067	0.455	2.6	0.912	0.011	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	26	16	62%	0.035	0.097	0.28	0.132	0.001	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	26	24	92%	0.06	0.49	3.1	0.98	0.01	NESV	---	---	Yes	No ESV Available
Pyrene	129-00-0	26	24	92%	0.058	0.314	1.3	0.516	0.01	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	26	25	96%	0.4095	3.1973	19.635	4.5016	0.0753	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	26	25	96%	0.428	3.229	20.17	4.547	0.075	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	26	25	96%	0.391	3.166	19.1	4.457	0.075	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	26	25	96%	0.4589	3.1138	15.455	4.2413	0.0909	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	26	25	96%	0.5208	3.2308	16.56	4.3937	0.0909	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	26	25	96%	0.397	2.997	14.35	4.091	0.091	NESV	---	---	Yes	No ESV Available

Table E-13
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
3- And 4- Methylphenol (Total)	106445	20	1	5%	0.13	0.13	0.13	---	---	0.67	0	<1	No	[Maximum] < ESV
4-Chloroaniline	106-47-8	26	2	8%	0.13	1.01	1.9	---	---	0.146	1	13	Yes	[Maximum] > ESV
Benzaldehyde	100-52-7	26	1	4%	0.038	0.038	0.038	---	0.007	NESV	---	---	No	< 5% Detected
Bis(2-Ethylhexyl) Phthalate	117-81-7	26	2	8%	0.074	0.297	0.52	---	0.027	8012.133962	0	<1	No	[Maximum] < ESV
Carbazole	86-74-8	26	18	69%	0.016	0.113	0.97	0.244	0.003	NESV	---	---	Yes	No ESV Available
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Acetone	67-64-1	5	5	100%	0.075	0.167	0.29	0.241	---	26.367	0	<1	No	[Maximum] < ESV
Carbon Disulfide	75-15-0	5	5	100%	0.0013	0.0051	0.011	0.0086	---	0.82467	0	<1	No	[Maximum] < ESV
Cyclohexane	110-82-7	5	2	40%	0.00093	0.00276	0.0046	---	---	NESV	---	---	Yes	No ESV Available
Methyl Ethyl Ketone (2-Butanone)	78-93-3	5	5	100%	0.013	0.038	0.08	0.065	---	26.741	0	<1	No	[Maximum] < ESV
Methylcyclohexane	108-87-2	5	2	40%	0.0014	0.0047	0.0081	---	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-14
Refined Ecological Screening for Surface Water
Southern Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Aluminum	7429-90-5	U	26	22	85%	15.3	1760.6	24500	6017.9	108.8	85	5	288.2	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	17	9	53%	42.6	482.7	2360	907.1	7.9	87	6	27.1	Yes	[Maximum] > ESV
Barium	7440-39-3	U	26	26	100%	156	371	2710	788	93	4	26	677.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	17	17	100%	119	259	527	314	86	4	17	131.8	Yes	[Maximum] > ESV
Copper	7440-50-8	U	26	19	73%	1.6	19.5	183	46.9	1.1	16.3	4	11.2	Yes	[Maximum] > ESV
Copper	7440-50-8	F	17	7	41%	1.9	8.1	33.4	12.7	1	2.87	1	11.6	Yes	[Maximum] > ESV
Iron	7439-89-6	U	26	23	88%	43.1	1606	22500	5191.7	126.5	1000	4	22.5	Yes	[Maximum] > ESV
Iron	7439-89-6	F	17	10	59%	55.3	354	1430	640.1	22.9	158	3	9.1	Yes	[Maximum] > ESV
Manganese	7439-96-5	U	26	23	88%	3.2	41.2	337	88.7	5.9	120	3	2.8	Yes	[Maximum] > ESV
Vanadium	7440-62-2	U	26	8	31%	1.6	5.3	24.8	6.6	0.6	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (µg/L unless otherwise noted)															
Cyanide	57-12-5	U	26	15	58%	3	26	139	43	1	5.2	11	26.7	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	5	3	60%	5.3	44.1	68.2	---	---	5.2	3	13.1	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	U	16	13	81%	1.8	4.4	10	5.6	0.9	5.2	4	1.9	Yes	[Maximum] > ESV
Nitrogen, Ammonia (As N)	7664-41-7	U	26	17	65%	53	740	8550	1943	72	635	1	13.5	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)															
Indeno(1,2,3-C,D)Pyrene	193-39-5	U	5	1	20%	0.28	0.28	0.28	---	0.04	0.275	1	1	Yes	[Maximum] > ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
µg/L; microgram per liter
F: Filtered

Table E-15
Refined Ecological Screening for Bulk Soil (0-2 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	8	8	100%	14700	17950	22700	19985	10794	NESV	---	---	No	pH > 5.5
Arsenic	7440-38-2	8	8	100%	4.1	5.9	7.8	6.8	3.9	6.8	2	1.1	Yes	[Maximum] > ESV
Barium	7440-39-3	8	8	100%	148	240	295	274	155	110	8	2.7	Yes	[Maximum] > ESV
Chromium, Hexavalent	18540-29-9	3	3	100%	0.3	0.33	0.38	---	---	0.34	1	1.1	No	See Text
Cobalt	7440-48-4	8	8	100%	5.8	7.6	9	8.3	5.8	13	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	8	8	100%	18.6	22	27.8	24.1	11.6	14	8	2	Yes	[Maximum] > ESV
Iron	7439-89-6	8	8	100%	14100	17313	20000	18632	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	8	8	100%	13	15	19	17	10	11	8	1.7	Yes	[Maximum] > ESV
Manganese	7439-96-5	8	8	100%	517	1070	1640	1349	465	220	8	7.5	Yes	[Maximum] > ESV
Nickel	7440-02-0	8	8	100%	16	26	44	32	11	38	1	1.2	Yes	[Maximum] > ESV
Selenium	7782-49-2	8	6	75%	0.34	0.64	1.4	0.79	0.13	0.52	4	2.7	Yes	[Maximum] > ESV
Vanadium	7440-62-2	8	8	100%	11.1	13.2	18	14.9	11.2	4.7	8	3.8	Yes	[Maximum] > ESV
Zinc	7440-66-6	8	8	100%	59	92	129	110	48	46	8	2.8	Yes	[Maximum] > ESV
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	8	8	100%	0.12	0.53	1.5	0.83	0.14	0.098	8	15.3	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	8	8	100%	8370	19034	30100	24617	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	8	8	100%	8110	10608	12200	11615	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	8	8	100%	872	1215	1700	1400	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	8	5	63%	60	105	171	116	33	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Benzo(A)Anthracene	56-55-3	8	8	100%	0.093	0.564	1	0.781	0.011	0.73	3	1.4	Yes	[Maximum] > ESV
Total HMW PAHs - 1/2MDL	---	8	8	100%	0.9595	6.1449	10.28	8.5018	0.1591	1.1	6	9.3	Yes	[Maximum] > ESV
Total HMW PAHs - MDL	---	8	8	100%	0.975	6.148	10.28	8.501	0.159	1.1	6	9.3	Yes	[Maximum] > ESV
Total HMW PAHs - Zero	---	8	8	100%	0.944	6.142	10.28	8.502	0.159	1.1	6	9.3	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzaldehyde	100-52-7	8	2	25%	0.056	0.062	0.069	---	0.024	NESV	---	---	Yes	No ESV Available
Bis(2-Ethylhexyl) Phthalate	117-81-7	8	1	13%	0.045	0.045	0.045	---	0.033	0.02	1	2.3	Yes	[Maximum] > ESV
Di-N-Butyl Phthalate	84-74-2	8	1	13%	0.039	0.039	0.039	---	0.01	0.011	1	3.5	Yes	[Maximum] > ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-16
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
Cedar Creek Reservoir Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Barium	7440-39-3	8	8	100%	148	240	295	274	99	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	8	8	100%	0.46	0.75	1	0.87	0.53	NESV	---	---	Yes	No ESV Available
Chromium, Hexavalent	18540-29-9	3	3	100%	0.3	0.3	0.4	---	---	NESV	---	---	No	See Text
Chromium, Trivalent	16065-83-1	3	3	100%	10.8	11.9	13.7	---	---	NESV	---	---	No	See Text
Manganese	7439-96-5	8	8	100%	517	1070	1640	1349	322	460	8	3.6	Yes	[Maximum] > ESV
Nickel	7440-02-0	8	8	100%	16	26	44	32	12	22.7	5	1.9	Yes	[Maximum] > ESV
Vanadium	7440-62-2	8	8	100%	11.1	13.2	18	14.9	9.6	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Zinc	7440-66-6	8	8	100%	59	92	129	110	49	121	2	1.1	Yes	[Maximum] > ESV
Cyanide	57-12-5	8	8	100%	0.12	0.53	1.5	0.83	0.07	0.1	8	15	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	8	8	100%	8370	19034	30100	24617	9774	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	8	8	100%	8110	10608	12200	11615	12517	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	8	8	100%	872	1215	1700	1400	732	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	8	5	63%	60	105	171	116	30	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	8	6	75%	0.034	0.055	0.075	0.061	0.003	NESV	---	---	Yes	No ESV Available
Anthracene	120-12-7	8	6	75%	0.066	0.107	0.14	0.118	0.003	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	8	8	100%	0.13	0.93	1.8	1.3	---	NESV	---	---	Yes	No ESV Available
Fluorene	86-73-7	8	6	75%	0.022	0.035	0.053	0.039	0.002	NESV	---	---	Yes	No ESV Available
Naphthalene	91-20-3	8	6	75%	0.013	0.023	0.045	0.028	0.002	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	8	8	100%	0.065	0.475	0.81	0.659	0.003	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	8	8	100%	0.23745	1.59287	2.89995	2.20764	0.03493	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	8	8	100%	0.2799	1.6119	2.9031	2.2132	0.0349	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	8	8	100%	0.195	1.574	2.897	2.202	0.035	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	8	8	100%	0.11	0.75	1.4	1.05	---	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	8	8	100%	0.093	0.564	1	0.781	0.002	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	8	8	100%	0.11	0.74	1.3	1.05	---	NESV	---	---	Yes	No ESV Available
Benzo(K)Fluoranthene	207-08-9	8	8	100%	0.051	0.384	0.75	0.538	0.003	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	8	8	100%	0.13	0.81	1.4	1.12	---	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	8	6	75%	0.14	0.21	0.28	0.23	---	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	8	8	100%	0.11	0.69	1.3	0.97	---	NESV	---	---	Yes	No ESV Available
Pyrene	129-00-0	8	8	100%	0.13	0.97	1.5	1.34	---	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	8	8	100%	0.9595	6.1449	10.28	8.5018	0.0205	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	8	8	100%	0.975	6.148	10.28	8.501	0.02	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	8	8	100%	0.944	6.142	10.28	8.502	0.02	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	8	8	100%	1.0335	6.6549	11.4711	9.1962	0.0349	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	8	8	100%	1.106	6.674	11.474	9.199	0.035	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	8	8	100%	0.961	6.636	11.468	9.193	0.035	NESV	---	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Acetophenone	98-86-2	8	1	13%	0.011	0.011	0.011	---	0.003	NESV	---	---	Yes	No ESV Available
Benzaldehyde	100-52-7	8	2	25%	0.056	0.062	0.069	---	0.006	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	8	8	100%	0.011	0.095	0.18	0.133	0.002	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-17
Refined Ecological Screening for Surface Water
Cedar Creek Overflow Ditch Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Aluminum	7429-90-5	U	27	20	74%	16.7	133.6	1610	369.2	17.8	47	2	34.3	Yes	[Maximum] > ESV
Barium	7440-39-3	U	27	27	100%	63.4	90.8	209	101.4	53.3	4	27	52.3	Yes	[Maximum] > ESV
Barium	7440-39-3	F	16	16	100%	69.9	91	218	106.5	53.5	4	16	54.5	Yes	[Maximum] > ESV
Iron	7439-89-6	U	27	5	19%	49.3	696.3	2910	688.2	34.2	1000	1	2.9	Yes	[Maximum] > ESV
Manganese	7439-96-5	U	27	26	96%	3	150	3750	749	2	120	1	31.3	Yes	[Maximum] > ESV
Vanadium	7440-62-2	U	27	6	22%	1.9	2.1	2.2	1.5	0.6	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (µg/L unless otherwise noted)															
Cyanide (Free)	FREE CN	U	11	3	27%	1.6	3.3	5.8	---	0.8	5.2	1	1.1	Yes	[Maximum] > ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
µg/L: micrograms per liter
F: Filtered

Table E-18
Refined Ecological Screening for Bulk Soil (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Soil Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	12	12	100%	12100	20617	35400	25796	10794	NESV	---	---	No	pH > 5.5
Arsenic	7440-38-2	12	12	100%	3.2	7.4	14.5	9.3	3.9	6.8	6	2.1	Yes	[Maximum] > ESV
Barium	7440-39-3	12	12	100%	136	448	905	586	155	110	12	8.2	Yes	[Maximum] > ESV
Beryllium	7440-41-7	12	10	83%	0.32	0.67	1.1	0.76	0.51	2.5	0	<1	No	[Maximum] < ESV
Cobalt	7440-48-4	12	12	100%	1.9	4.8	6.6	5.6	5.8	13	0	<1	No	95% UCL < Background
Copper	7440-50-8	12	12	100%	10.1	20.4	42.5	26.1	11.6	14	6	3	Yes	[Maximum] > ESV
Iron	7439-89-6	12	12	100%	7770	14242	25200	16716	13150	NESV	---	---	No	pH > 5
Lead	7439-92-1	12	12	100%	6.1	11.6	17.6	13.5	10.4	11	7	1.6	Yes	[Maximum] > ESV
Manganese	7439-96-5	12	12	100%	34.1	317.6	988	479.9	464.9	220	6	4.5	Yes	[Maximum] > ESV
Nickel	7440-02-0	12	12	100%	6	11	15	12	11	38	0	<1	No	[Maximum] < ESV
Selenium	7782-49-2	12	4	33%	0.57	2.07	4.4	1.62	0.13	0.52	4	8.5	Yes	[Maximum] > ESV
Vanadium	7440-62-2	12	12	100%	7.9	11.6	17.2	12.9	11.2	4.7	12	3.7	Yes	[Maximum] > ESV
Zinc	7440-66-6	12	12	100%	16	36	65	43	48	46	2	1.4	No	95% UCL < Background
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	12	7	58%	0.11	0.41	0.84	0.41	0.14	0.098	7	8.6	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	12	12	100%	2500	8153	17800	10678	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	12	12	100%	2570	6329	13800	8109	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	12	12	100%	452	908	1200	1048	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	12	11	92%	51	368	844	470	33	NESV	---	---	No	Essential Nutrient
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzaldehyde	100-52-7	12	2	17%	0.039	0.069	0.1	---	0.024	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-19
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Aluminum	7429-90-5	12	12	100%	12100	20617	35400	25796	10794	26000	3	1.4	No	pH > 5.5
Arsenic	7440-38-2	12	12	100%	3.2	7.4	14.5	9.3	3.9	9.79	3	1.5	Yes	[Maximum] > ESV
Barium	7440-39-3	12	12	100%	136	448	905	586	155	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	12	10	83%	0.32	0.67	1.1	0.76	0.51	NESV	---	---	Yes	No ESV Available
Copper	7440-50-8	12	12	100%	10.1	20.4	42.5	26.1	11.6	31.6	3	1.3	Yes	[Maximum] > ESV
Iron	7439-89-6	12	12	100%	7770	14242	25200	16716	13150	20000	2	1.3	No	pH > 5
Manganese	7439-96-5	12	12	100%	34.1	317.6	988	479.9	464.9	460	3	2.1	Yes	[Maximum] > ESV
Selenium	7782-49-2	12	4	33%	0.57	2.07	4.4	1.62	0.13	2	2	2.2	Yes	[Maximum] > ESV
Vanadium	7440-62-2	12	12	100%	7.9	11.6	17.2	12.9	11.2	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	12	7	58%	0.11	0.41	0.84	0.41	0.14	0.1	7	8.4	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	12	12	100%	2500	8153	17800	10678	3741	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	12	12	100%	2570	6329	13800	8109	7003	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	12	12	100%	452	908	1200	1048	1540	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	12	11	92%	51	368	844	470	33	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Anthracene	120-12-7	12	3	25%	0.0098	0.0116	0.013	---	0.002	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	12	11	92%	0.013	0.074	0.15	0.093	0.023	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	12	11	92%	0.0058	0.0412	0.085	0.0519	0.0117	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	12	11	92%	0.02475	0.14272	0.241	0.1853	0.04218	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	12	11	92%	0.0307	0.1666	0.29	0.214	0.0422	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	12	11	92%	0.0188	0.1188	0.2068	0.158	0.0422	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	12	11	92%	0.007	0.05	0.091	0.064	0.018	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	12	10	83%	0.0061	0.0413	0.074	0.0494	0.0111	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	12	11	92%	0.0076	0.0518	0.1	0.065	0.0234	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	12	11	92%	0.016	0.074	0.2	0.098	0.023	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	12	7	58%	0.0066	0.0126	0.021	0.0131	0.0033	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	12	11	92%	0.0061	0.0413	0.093	0.0523	0.0183	NESV	---	---	Yes	No ESV Available
Pyrene	129-00-0	12	11	92%	0.011	0.065	0.12	0.081	0.018	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	12	11	92%	0.07365	0.4428	0.8145	0.59205	0.15913	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	12	11	92%	0.0746	0.4475	0.828	0.596	0.1591	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	12	11	92%	0.0727	0.4381	0.812	0.5883	0.1591	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	12	11	92%	0.0824	0.5024	0.8925	0.6641	0.1681	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	12	11	92%	0.0883	0.5273	0.956	0.6916	0.1681	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	12	11	92%	0.0765	0.4775	0.8588	0.6375	0.1681	NESV	---	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Acetophenone	98-86-2	12	1	8%	0.0093	0.0093	0.0093	---	0.0045	NESV	---	---	Yes	No ESV Available
Benzaldehyde	100-52-7	12	2	17%	0.039	0.069	0.1	---	0.024	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	12	9	75%	0.0023	0.0127	0.023	0.0148	0.0031	NESV	---	---	Yes	No ESV Available
Phenol	108-95-2	12	1	8%	0.13	0.13	0.13	---	0.01	0.24402	0	<1	No	[Maximum] < ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-20
Refined Ecological Screening for Surface Water
Northern Surface Water Feature Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Aluminum	7429-90-5	U	16	15	94%	16.1	517.8	5750	2712.6	17.8	57	3	100.9	Yes	[Maximum] > ESV
Barium	7440-39-3	U	16	16	100%	77.9	124.9	245	146.5	53.3	4	16	61.3	Yes	[Maximum] > ESV
Barium	7440-39-3	F	11	11	100%	83.5	121.3	229	147.2	53.5	4	11	57.3	Yes	[Maximum] > ESV
Copper	7440-50-8	U	16	2	13%	2.6	4.2	5.7	---	2.1	18.4	0	<1	No	[Maximum] < ESV
Iron	7439-89-6	U	16	8	50%	50.2	703.9	4760	1696.2	34.2	1000	1	4.8	Yes	[Maximum] > ESV
Manganese	7439-96-5	U	16	13	81%	3	26	127	52	2	120	1	1.1	Yes	[Maximum] > ESV
Selenium	7782-49-2	U	16	1	6%	1.5	1.5	1.5	---	0.3	5	0	<1	No	[Maximum] < ESV
Vanadium	7440-62-2	U	16	3	19%	2.1	2.7	3.9	---	0.6	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (µg/L unless otherwise noted)															
Fluoride	16984-48-8	U	16	16	100%	166	215	301	228	44	3356	0	<1	No	[Maximum] < ESV
Fluoride	16984-48-8	F	1	1	100%	188	188	188	---	---	3685	0	<1	No	[Maximum] < ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
µg/L: microgram per liter
F: Filtered

Table E-21
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Barium	7440-39-3	10	10	100%	83.9	135.7	208	160.9	55.1	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	10	10	100%	0.27	0.48	0.74	0.57	0.26	NESV	---	---	Yes	No ESV Available
Thallium	7440-28-0	10	1	10%	0.18	0.18	0.18	---	0.07	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	10	10	100%	11.8	16.3	24.2	18.6	10.8	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	10	10	100%	0.27	0.81	1.7	1.05	0.04	0.1	10	17	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	10	10	100%	12400	20260	41600	26325	11739	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	10	10	100%	9740	12134	15000	13193	8657	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	10	10	100%	591	1033	1560	1240	353	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	10	10	100%	55.2	107.4	192	135.1	20.3	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Fluoranthene	206-44-0	10	10	100%	0.023	0.156	0.94	0.553	0.001	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	10	8	80%	0.0083	0.0365	0.14	0.0936	0.0012	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	10	10	100%	0.04055	0.21884	1.12515	0.67742	0.01103	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	10	10	100%	0.0481	0.251	1.1703	0.7163	0.011	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	10	10	100%	0.024	0.187	1.08	0.641	0.011	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	10	8	80%	0.0089	0.0421	0.091	0.0549	0.0007	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	10	6	60%	0.011	0.034	0.074	0.053	0.001	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	10	8	80%	0.011	0.041	0.084	0.053	0.001	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	10	10	100%	0.019	0.12	0.5	0.284	0.001	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	10	6	60%	0.0032	0.0198	0.05	0.0247	0.0005	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	10	8	80%	0.0095	0.0564	0.12	0.0766	0.0004	NESV	---	---	Yes	No ESV Available
Pyrene	129-00-0	10	10	100%	0.019	0.106	0.52	0.321	0.001	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	10	10	100%	0.1162	0.5195	1.6585	1.0534	0.0068	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	10	10	100%	0.1162	0.5434	1.685	1.061	0.0068	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	10	10	100%	0.088	0.496	1.632	1.079	0.007	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	10	10	100%	0.13445	0.62593	2.43905	1.32828	0.01103	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	10	10	100%	0.1407	0.6783	2.5061	1.3667	0.011	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	10	10	100%	0.071	0.574	2.372	1.366	0.011	NESV	---	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Acetophenone	98-86-2	9	1	11%	0.0085	0.0085	0.0085	---	0.0006	NESV	---	---	Yes	No ESV Available
Benzaldehyde	100-52-7	9	3	33%	0.019	0.042	0.062	---	0.002	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	9	5	56%	0.0031	0.0255	0.07	0.0319	0.0005	NESV	---	---	Yes	No ESV Available
Phenol	108-95-2	9	1	11%	0.043	0.043	0.043	---	0.003	0.09618	0	<1	No	[Maximum] < ESV
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Acetone	67-64-1	5	5	100%	0.023	0.032	0.04	0.039	---	3.2289	0	<1	No	[Maximum] < ESV
Carbon Disulfide	75-15-0	5	5	100%	0.00076	0.00163	0.0026	0.00236	---	0.100989	0	<1	No	[Maximum] < ESV
Cyclohexane	110-82-7	5	5	100%	0.0014	0.0023	0.0032	0.0031	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	5	5	100%	0.0028	0.0042	0.006	0.0054	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-22
Refined Ecological Screening for Surface Water
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Aluminum	7429-90-5	U	15	15	100%	53.1	3591.6	32000	25297	108.8	370	6	86.5	Yes	[Maximum] > ESV
Aluminum	7429-90-5	F	15	11	73%	26.1	248	614	291.8	7.9	87	6	7.1	Yes	[Maximum] > ESV
Barium	7440-39-3	U	15	15	100%	122	328	1230	627	93	4	15	307.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	15	15	100%	117	231	401	267	86	4	15	100.3	Yes	[Maximum] > ESV
Beryllium	7440-41-7	U	15	3	20%	0.27	0.96	2	---	0.13	0.66	1	3	Yes	[Maximum] > ESV
Copper	7440-50-8	U	15	12	80%	2.1	12.3	67.7	29.8	1.1	17.475	2	3.9	Yes	[Maximum] > ESV
Iron	7439-89-6	U	15	15	100%	196	7172	52100	17093	126	1000	9	52.1	Yes	[Maximum] > ESV
Iron	7439-89-6	F	15	15	100%	48.7	1372.4	10200	8107.9	22.9	158	9	64.6	Yes	[Maximum] > ESV
Lead	7439-92-1	U	15	11	73%	0.37	5.6	38.5	20.6	0.19	5.604	2	6.9	Yes	[Maximum] > ESV
Manganese	7439-96-5	U	15	15	100%	6.1	678.9	2570	1404.2	5.9	120	12	21.4	Yes	[Maximum] > ESV
Manganese	7439-96-5	F	15	15	100%	4.2	509.1	2420	1121.5	2.1	1100	3	2.2	Yes	[Maximum] > ESV
Vanadium	7440-62-2	U	15	4	27%	1.8	18.4	46.8	12	0.6	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (µg/L unless otherwise noted)															
Cyanide	57-12-5	U	15	15	100%	5.1	169	630	334.9	1	5.2	14	121.2	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	5	5	100%	9.9	95.4	245	183.9	---	5.2	5	47.1	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	U	15	14	93%	3.4	28.9	140	61.4	0.9	5.2	9	26.9	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	F	5	5	100%	1.8	19.4	63.5	44.9	---	5.2	2	12.2	Yes	[Maximum] > ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)															
Pyrene	129-00-0	U	6	3	50%	0.19	1.13	1.8	---	0.03	0.025	3	72	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (µg/L)															
3- And 4- Methylphenol (Total)	MEPH3MEPH4	U	5	1	20%	7.5	7.5	7.5	---	---	NESV	---	---	Yes	No ESV Available
Benzaldehyde	100-52-7	U	6	1	17%	2.3	2.3	2.3	---	0.1	NESV	---	---	Yes	No ESV Available
Caprolactam	105-60-2	U	6	1	17%	0.97	0.97	0.97	---	1.14	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	U	6	2	33%	1.9	2.4	2.9	---	0	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
TCL: Target Compound List
U: Unfiltered
µg/L: microgram per liter
F: Filtered

Table E-23
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Barium	7440-39-3	32	32	100%	38	89	151	100	55	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	32	31	97%	0.22	0.39	0.57	0.42	0.26	NESV	---	---	Yes	No ESV Available
Vanadium	7440-62-2	32	32	100%	7.5	14.3	25.5	15.6	10.8	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	32	17	53%	0.067	1.601	8.3	1.686	0.038	0.1	15	83	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	32	32	100%	7390	15866	31400	17596	11739	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	32	32	100%	7010	9819	12100	10161	8657	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	32	32	100%	279	669	1160	736	353	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	32	15	47%	39.9	94.6	198	74.3	20.3	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	32	5	16%	0.0011	0.0123	0.033	0.0054	0.0006	NESV	---	---	Yes	No ESV Available
Anthracene	120-12-7	32	9	28%	0.0012	0.0474	0.16	0.0365	0.0006	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	32	22	69%	0.0011	0.7677	6.5	1.3831	0.0014	NESV	---	---	Yes	No ESV Available
Fluorene	86-73-7	32	1	3%	0.03	0.03	0.03	---	---	NESV	---	---	No	< 5% Detected
Naphthalene	91-20-3	32	2	6%	0.016	0.018	0.019	---	---	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	32	21	66%	0.0019	0.121	1	0.2391	0.0012	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	32	22	69%	0.00594	0.93726	7.755	1.99786	0.01103	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	32	22	69%	0.00888	0.96611	7.768	2.00558	0.01103	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	32	22	69%	0.003	0.908	7.742	2.011	0.011	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	32	14	44%	0.0014	0.1718	0.87	0.1945	0.0007	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	32	17	53%	0.00095	0.3119	2.1	0.45553	0.00079	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	32	18	56%	0.00098	0.18175	1.2	0.2589	0.00071	NESV	---	---	Yes	No ESV Available
Benzo(K)Fluoranthene	207-08-9	32	17	53%	0.0015	0.312	1.9	0.4186	0.0007	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	32	22	69%	0.0013	0.7077	4.9	1.2073	0.0009	NESV	---	---	Yes	No ESV Available
Dibenz(A,H)Anthracene	53-70-3	32	9	28%	0.0013	0.1098	0.41	0.088	0.0005	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	32	17	53%	0.00098	0.2136	1.5	0.30338	0.00045	NESV	---	---	Yes	No ESV Available
Pyrene	129-00-0	32	21	66%	0.0014	0.7137	6.8	1.3647	0.0011	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	32	22	69%	0.00709	2.86264	23.18	6.45656	0.00676	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	32	22	69%	0.0096	2.8772	23.18	6.3983	0.0068	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	32	22	69%	0.00458	2.84811	23.18	6.55334	0.00676	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	32	22	69%	0.01133	3.28688	26.829	7.27345	0.01103	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	32	22	69%	0.01628	3.32628	26.836	7.22361	0.01103	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	32	22	69%	0.00638	3.24747	26.822	7.3757	0.01103	NESV	---	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
3- And 4- Methylphenol (Total)	106445	15	4	27%	0.024	0.192	0.49	0.126	---	0.67	0	<1	No	[Maximum] < ESV
Benzaldehyde	100-52-7	27	2	7%	0.0098	0.0474	0.085	---	0.0018	NESV	---	---	Yes	No ESV Available
Bis(2-Ethylhexyl) Phthalate	117-81-7	27	3	11%	0.018	0.103	0.26	---	0.012	20.455	0	<1	No	[Maximum] < ESV
Carbazole	86-74-8	27	6	22%	0.0028	0.1198	0.36	0.1062	0.0005	NESV	---	---	Yes	No ESV Available
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)														
Acetone	67-64-1	6	6	100%	0.018	0.045	0.089	0.068	---	6.923	0	<1	No	[Maximum] < ESV
Carbon Disulfide	75-15-0	6	6	100%	0.00045	0.00417	0.014	0.00833	---	0.216	0	<1	No	[Maximum] < ESV
Cyclohexane	110-82-7	6	6	100%	0.0013	0.0025	0.0039	0.0034	---	NESV	---	---	Yes	No ESV Available
Methyl Acetate	79-20-9	6	1	17%	0.11	0.11	0.11	---	---	NESV	---	---	Yes	No ESV Available
Methylcyclohexane	108-87-2	6	6	100%	0.0023	0.0049	0.0085	0.0067	---	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-24
Refined Ecological Screening for Surface Water
Flathead River Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Aluminum	7429-90-5	U	76	70	92%	17.5	333.4	1540	486.2	108.8	51	21	30.2	Yes	[Maximum] > ESV
Barium	7440-39-3	U	76	76	100%	62.8	110.1	216	116.8	92.6	4	76	54	Yes	[Maximum] > ESV
Barium	7440-39-3	F	49	49	100%	62.5	95.3	191	103.6	86.4	4	49	47.8	Yes	[Maximum] > ESV
Copper	7440-50-8	U	76	21	28%	1.4	4.2	12.3	3.2	1.1	7.46	0	1.6	No	[Maximum] < ESV
Copper	7440-50-8	F	49	2	4%	3	15	26	---	1	0.12	1	219.7	No	< 5% Detected
Iron	7439-89-6	U	76	51	67%	62.4	551.7	1640	477.5	126.5	1000	8	1.6	Yes	[Maximum] > ESV
Iron	7439-89-6	F	49	11	22%	45.8	98.6	164	62.6	22.9	158	1	1	Yes	[Maximum] > ESV
Manganese	7439-96-5	U	76	54	71%	2.6	29.3	212	28.4	5.9	120	1	1.8	Yes	[Maximum] > ESV
Nickel	7440-02-0	F	49	2	4%	1.3	16.8	32.2	---	0.7	32.612	0	<1	No	< 5% Detected
Vanadium	7440-62-2	U	76	4	5%	1.2	1.4	1.9	1.2	0.6	NESV	---	---	Yes	No ESV Available
Other Inorganic Parameters (µg/L unless otherwise noted)															
Cyanide	57-12-5	U	76	28	37%	3.2	107.9	378	85	1	5.2	27	72.7	Yes	[Maximum] > ESV
Cyanide	57-12-5	F	15	9	60%	11.7	108.7	328	182.8	---	5.2	9	63.1	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	U	48	26	54%	1.5	19.3	139	26.8	0.9	5.2	14	26.7	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	F	10	10	100%	1.6	10.3	42.2	23.2	---	5.2	7	8.1	Yes	[Maximum] > ESV
Fluoride	16984-48-8	U	76	65	86%	28.6	450.8	2570	742.1	15	1285	0	2	No	[Maximum] < ESV
Fluoride	16984-48-8	F	9	9	100%	109	179	558	389	---	1454	0	<1	No	[Maximum] < ESV
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)															
Benzo(A)Anthracene	56-55-3	U	11	3	27%	0.0048	0.2353	0.63	---	0.0361	2.227	0	<1	No	[Maximum] < ESV
Benzo(A)Pyrene	50-32-8	U	11	2	18%	0.041	0.145	0.25	---	0.026	0.957	0	<1	No	[Maximum] < ESV
Benzo(B)Fluoranthene	205-99-2	U	11	3	27%	0.0056	0.2685	0.7	---	0.0468	0.677	1	1	Yes	[Maximum] > ESV
Benzo(G,H,I)Perylene	191-24-2	U	11	1	9%	0.044	0.044	0.044	---	0.033	0.439	0	<1	No	[Maximum] < ESV
Benzo(K)Fluoranthene	207-08-9	U	11	2	18%	0.095	0.277	0.46	---	0.043	0.641	0	<1	No	[Maximum] < ESV
Chrysene	218-01-9	U	11	4	36%	0.011	0.351	1.2	0.366	0.039	2.042	0	<1	No	[Maximum] < ESV
Dibenz(A,H)Anthracene	53-70-3	U	11	1	9%	0.015	0.015	0.015	---	0.035	0.282	0	<1	No	[Maximum] < ESV
Fluoranthene	206-44-0	U	11	4	36%	0.0077	0.5872	2.1	---	0.0292	7.109	0	<1	No	[Maximum] < ESV
Indeno(1,2,3-C,D)Pyrene	193-39-5	U	11	1	9%	0.04	0.04	0.04	---	0.04	0.275	0	<1	No	[Maximum] < ESV
Phenanthrene	85-01-8	U	11	2	18%	0.024	0.612	1.2	---	0.052	19.13	0	<1	No	[Maximum] < ESV
Pyrene	129-00-0	U	11	4	36%	0.0069	0.453	1.6	---	0.0261	0.025	2	64	Yes	[Maximum] > ESV
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (µg/L)															
Bis(2-Ethylhexyl) Phthalate	117-81-7	U	11	4	36%	1.2	9.1	22	7.7	3.1	16	1	1.4	Yes	[Maximum] > ESV
Caprolactam	105-60-2	U	11	4	36%	0.6	0.9	1.1	0.9	1.1	NESV	---	---	No	95% UCL < Background

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
TCL: Target Compound List
U: Unfiltered
µg/L: microgram per liter
F: Filtered

Table E-25
Refined Ecological Screening for Bulk Sediment (0-0.5 feet)
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Sediment Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (mg/kg)														
Barium	7440-39-3	9	9	100%	20.2	122.8	249	165	99.3	NESV	---	---	Yes	No ESV Available
Beryllium	7440-41-7	9	9	100%	0.21	0.36	0.68	0.45	0.53	NESV	---	---	No	95% UCL < Background
Manganese	7439-96-5	9	9	100%	67.3	252.3	571	348.9	322.2	460	1	1.2	Yes	[Maximum] > ESV
Vanadium	7440-62-2	9	9	100%	4.6	7.1	8.8	8	9.6	NESV	---	---	No	95% UCL < Background
Other Inorganic Parameters (mg/kg unless otherwise noted)														
Cyanide	57-12-5	9	4	44%	0.1	0.2	0.2	0.2	0.1	0.1	3	2.4	Yes	[Maximum] > ESV
Essential Nutrients (mg/kg)														
Calcium	7440-70-2	9	9	100%	1120	15558	37000	22760	9774	NESV	---	---	No	Process-Related Essential Nutrient
Magnesium	7439-95-4	9	9	100%	5410	9070	13700	10857	12517	NESV	---	---	No	Essential Nutrient
Potassium	7440-09-7	9	9	100%	177	658	1230	829	732	NESV	---	---	No	Essential Nutrient
Sodium	7440-23-5	9	5	56%	40.2	103.3	154	107.5	29.6	NESV	---	---	No	Essential Nutrient
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)														
Acenaphthene	83-32-9	9	2	22%	0.0058	0.0084	0.011	---	0.0028	NESV	---	---	Yes	No ESV Available
Acenaphthylene	208-96-8	9	3	33%	0.011	0.022	0.033	---	0.002	NESV	---	---	Yes	No ESV Available
Anthracene	120-12-7	9	3	33%	0.026	0.042	0.051	---	0.003	NESV	---	---	Yes	No ESV Available
Fluoranthene	206-44-0	9	9	100%	0.0023	0.0832	0.19	0.1288	0.0026	NESV	---	---	Yes	No ESV Available
Fluorene	86-73-7	9	2	22%	0.013	0.021	0.028	---	0.002	NESV	---	---	Yes	No ESV Available
Phenanthrene	85-01-8	9	8	89%	0.0028	0.0989	0.21	0.1404	0.003	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - 1/2MDL	---	9	9	100%	0.0107	0.2472	0.512	0.3712	0.0349	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - MDL	---	9	9	100%	0.0163	0.2952	0.591	0.4338	0.0349	NESV	---	---	Yes	No ESV Available
Total LMW PAHs - Zero	---	9	9	100%	0.0051	0.1992	0.454	0.3155	0.0349	NESV	---	---	Yes	No ESV Available
Benzo(A)Pyrene	50-32-8	9	6	67%	0.0032	0.0547	0.094	0.0615	0.0021	NESV	---	---	Yes	No ESV Available
Benzo(A)Anthracene	56-55-3	9	5	56%	0.0034	0.0655	0.12	0.0729	0.002	NESV	---	---	Yes	No ESV Available
Benzo(G,H,I)Perylene	191-24-2	9	4	44%	0.03	0.06	0.08	0.05	---	NESV	---	---	Yes	No ESV Available
Chrysene	218-01-9	9	8	89%	0.0052	0.0644	0.13	0.0871	0.0021	NESV	---	---	Yes	No ESV Available
Indeno(1,2,3-C,D)Pyrene	193-39-5	9	4	44%	0.022	0.049	0.087	0.049	0.002	NESV	---	---	Yes	No ESV Available
Pyrene	129-00-0	9	7	78%	0.0058	0.0867	0.16	0.1102	0.0023	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - 1/2MDL	---	9	8	89%	0.0278	0.3879	0.845	0.5862	0.0205	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - MDL	---	9	8	89%	0.0345	0.4477	0.898	0.6493	0.0205	NESV	---	---	Yes	No ESV Available
Total HMW PAHs - Zero	---	9	8	89%	0.0131	0.3282	0.792	0.539	0.0205	NESV	---	---	Yes	No ESV Available
Total PAHs - 1/2MDL	---	9	9	100%	0.01685	0.54528	1.1885	0.82608	0.03493	NESV	---	---	Yes	No ESV Available
Total PAHs - MDL	---	9	9	100%	0.0286	0.6361	1.345	0.938	0.0349	NESV	---	---	Yes	No ESV Available
Total PAHs - Zero	---	9	9	100%	0.0051	0.4545	1.085	0.731	0.0349	NESV	---	---	Yes	No ESV Available
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)														
Benzaldehyde	100-52-7	9	3	33%	0.15	0.16	0.17	---	0.01	NESV	---	---	Yes	No ESV Available
Carbazole	86-74-8	9	2	22%	0.0049	0.0073	0.0098	---	0.0023	NESV	---	---	Yes	No ESV Available

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
NESV: No Ecological Screening Value
[Maximum]: Maximum concentration
MDL: Method Detection Limit
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List

Table E-26
Refined Ecological Screening for Surface Water
Cedar Creek Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	Fraction	Number of Samples	Number of Detections	Detection Frequency	Minimum Detected Concentration	Mean Detected Concentration	Maximum Concentration	UCL Value	Mean Surface Water Background Concentration	Refined Ecological Screening Value (ESV)	Result Concentrations > ESV	Maximum Hazard Quotient (HQ _{Max})	COPEC Decision	COPEC Decision Rationale
TAL Metals (µg/L)															
Barium	7440-39-3	U	28	28	100%	85.9	104.7	130	108.2	53.3	4	28	32.5	Yes	[Maximum] > ESV
Barium	7440-39-3	F	16	16	100%	85.9	99.7	117	104.6	53.5	4	16	29.3	Yes	[Maximum] > ESV
Chromium, Total	7440-47-3	U	28	2	7%	8.9	23.3	37.7	---	0.7	125.994	0	<1	No	[Maximum] < ESV
Copper	7440-50-8	U	28	9	32%	1.9	4.3	8.5	3	2.1	17.761	0	<1	No	[Maximum] < ESV
Iron	7439-89-6	U	28	3	11%	100	178	304	---	34	1000	0	<1	No	[Maximum] < ESV
Zinc	7440-66-6	F	16	1	6%	25.4	25.4	25.4	---	3.5	175	0	<1	No	[Maximum] < ESV
Other Inorganic Parameters (µg/L unless otherwise noted)															
Cyanide	57-12-5	U	32	7	22%	2	5	15	5	1	5.2	2	2.9	Yes	[Maximum] > ESV
Cyanide (Free)	FREE CN	U	20	2	10%	1.9	4.8	7.7	---	0.8	5.2	1	1.5	Yes	[Maximum] > ESV
Fluoride	16984-48-8	U	28	22	79%	55.8	113.9	137	107.5	43.8	3228	0	<1	No	[Maximum] < ESV
Fluoride	16984-48-8	F	4	4	100%	121	128	131	129	---	3539	0	<1	No	[Maximum] < ESV

Notes:
---: Not applicable.
COPEC: Constituent of Potential Ecological Concern
[Maximum]: Maximum concentration
NESV: No Ecological Screening Value
MDL: Method Detection Limit
SW: Surface Water
TAL: Target Analyte List
U: Unfiltered
µg/L: microgram per liter
F: Filtered



Appendix F Equilibrium Partitioning Sediment Benchmark Calculations for Certain Non-ionic Organic Constituents

Table F-1
Summary of Equilibrium Partitioning Sediment Benchmarks
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	ESB (mg/kg @ 1% OC)	Source
1,1,1-Trichloroethane	71556	0.213	EPA R3 @ 1%OC
1,1,2,2-Tetrachloroethane	79345	1.36	EPA R3 @ 1%OC
1,1,2-Trichloroethane	79005	1.24	EPA R3 @ 1%OC
1,1-Dichloroethene	75354	0.031	EPA R3 @ 1%OC
1,2,3-Trichlorobenzene	87616	0.858	EPA R3 @ 1%OC
1,2,4-Trichlorobenzene	120821	2.1	EPA R3 @ 1%OC
1,3-Dichlorobenzene	541731	4.43	EPA R3 @ 1%OC
1,4-Dichlorobenzene	106467	0.599	EPA R3 @ 1%OC
2,3,4,6-Tetrachlorophenol	58902	0.284	EPA R3 @ 1%OC
2,4,6-Trichlorophenol	88062	0.213	EPA R3 @ 1%OC
2,4-Dichlorophenol	120832	0.117	EPA R3 @ 1%OC
2,4-Dinitrotoluene	121142	0.0416	EPA R3 @ 1%OC
2-Chlorophenol	95578	0.0312	EPA R3 @ 1%OC
3,3'-Dichlorobenzidine	91941	0.127	EPA R3 @ 1%OC
4-Bromophenyl Phenyl Ether	101553	1.23	EPA R3 @ 1%OC
Atrazine	1912249	0.00662	EPA R3 @ 1%OC
Acetone	67641	14.1	Derived using SW Screening-Level ESVs. mg/kg dw @ 1% OC
Benzyl Butyl Phthalate	85687	10.9	EPA R3 @ 1%OC
Biphenyl (Diphenyl)	92524	1.22	EPA R3 @ 1%OC
Bis(2-ethylhexyl) phthalate	117817	5306.05	Derived using SW Screening-Level ESVs. mg/kg dw @ 1% OC
Bromoform	75252	0.654	EPA R3 @ 1%OC
Carbon Disulfide	75150	0.441	Derived using SW Refined ESV. mg/kg dw @ 1% OC
Chlorobenzene	108907	0.00842	EPA R3 @ 1%OC
Delta BHC (Delta Hexachlorocyclohexane)	319868	6.4	EPA R3 @ 1%OC
Dibenzofuran	132649	17	EPA 2008 @ 1%OC
Diethyl Phthalate	84662	0.603	EPA R3 @ 1%OC
Di-N-Butyl Phthalate	84742	6.47	EPA R3 @ 1%OC
Ethylbenzene	100414	1.1	EPA R3 @ 1%OC
Hexachloroethane	67721	1.027	EPA R3 @ 1%OC
Isopropylbenzene (Cumene)	98828	0.086	EPA R3 @ 1%OC
Methoxychlor	72435	0.187	EPA R3 @ 1%OC
Methyl Ethyl Ketone	78933	14.3	Derived using SW Screening-Level ESVs. mg/kg dw @ 1% OC
N-Nitrosodiphenylamine	86306	2.68	EPA R3 @ 1%OC
Phenol	108952	0.42	EPA R3 @ 1%OC
Styrene	100425	0.559	EPA R3 @ 1%OC
Trans-1,2-Dichloroethene	156605	1.05	EPA R3 @ 1%OC

Notes:

dw: Dry Weight

EPA: Environmental Protection Agency

ESB: Equilibrium Sediment Benchmark

ESV: Ecological Screening Value

OC: Organic Carbon

SW: Surface Water

Table F-2
Summary of Equilibrium Partitioning Sediment Benchmarks Based on NOEC Aqueous Toxicity Data
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	CAS Number	log K _{ow}	log K _{oc}	Molecular Weight (g/mol)	Chemical Class Correction	Final Chronic Value (FCV) (µg/L)	FCV Toxicological Basis	FCV Source	ESB _{NOEC} (µg/kg oc)	ESB _{NOEC} (µg/kg dw) 1% TOC
Semi-Volatile Organic Compounds										
Acetone	67641	-0.24	-0.24	58.08	0	1500	Conventional	ORNL Tier II SCV	150,872	1,509
Carbon Disulfide	75150	1.94	1.91	76.13	0	244	Conventional	Suter and Tsao (1996)	44,110.1	441
Methyl Ethyl Ketone	78933	0.316	0.31	72.11	0	14000	Conventional	ORNL Tier II SCV	1,428,644	14,286
Bis(2-Ethylhexyl)Phthalate	117817	8.39	8.25	390.57	0	3	Conventional	ORNL Tier II SCV	530,604,898	5,306,049

Notes:

FCV: Final chronic value

ESB_{NOEC}: Equilibrium-partitioning sediment benchmark based on NOEC aqueous toxicity data

TOC: Total organic carbon

Assumes 50% moisture/50% solids based on minimum average %solids by exposure area.



Appendix G Equilibrium Partitioning Sediment Benchmark Toxicity Units Calculations for Polycyclic Aromatic Hydrocarbons

Table G-1
Summary of Equilibrium Partitioning Sediment Benchmark Toxicity Units for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth Interval (ft)	Sample Date	Sample Type	Percent TOC	Σ ESBTU ₁₃	Σ ESBTU ₃₄ (Estimated)	Σ ESBTU ₃₄	Total PAHs ₁₃ (mg/kg)	Total PAHs ₃₄ (mg/kg)
Cedar Creek Area										
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	16.0	0.001	0.003	---	0.119	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	0.6	0.004	0.012	---	0.021	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	26.6	0.002	0.005	---	0.333	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	0.2	0.004	0.010	---	0.0051	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	27.7	0.005	0.013	---	0.984	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	2.0	0.045	0.124	---	0.6408	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	0.2	0.025	0.070	---	0.0346	---
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	10.8	0.013	0.037	---	1.045	---
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	0.2	0.483	1.329	---	0.792	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	0.9	0.014	0.039	---	0.092	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	0.2	0.007	0.019	---	0.0109	---
Cedar Creek Reservoir Overflow Ditch Area										
CFSB-282-SO-0-0.5	CFSB-282	0.00-0.50	6/16/2018	N	2.9	0.253	0.695	---	5.713	---
CFSB-283-SO-0-0.5	CFSB-283	0.00-0.50	6/16/2018	N	5.3	0.253	0.697	---	10.638	---
CFSB-284-SO-0-0.5	CFSB-284	0.00-0.50	6/16/2018	N	0.006	77.106	212.040	---	7.403	---
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	4.3	0.030	0.081	---	1.024	---
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	9.2	0.115	0.317	---	8.586	---
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	5.2	0.195	0.536	---	7.878	---
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	6.2	0.140	0.385	---	6.845	---
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	18.3	0.006	0.017	---	0.911	---
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	6.1	0.128	0.353	---	6.225	---
South Percolation Pond Area										
CFSB-101-SO-0-0.5	CFSB-101	0.00-0.50	7/21/2016	N	7.8	0.006	0.016	---	0.363	---
CFSB-102-SO-0-0.5	CFSB-102	0.00-0.50	7/13/2016	N	7.8	0.018	0.049	---	1.144	---
CFSB-104-SO-0-0.5	CFSB-104	0.00-0.50	7/13/2016	N	7.8	0.031	0.085	---	1.96	---
CFSB-109-SO-0-0.5	CFSB-109	0.00-0.50	7/13/2016	N	7.8	0.059	0.161	---	3.7	---
CFSB-110-SO-0-0.5	CFSB-110	0.00-0.50	7/14/2016	N	7.8	0.026	0.073	---	1.69	---
CFSB-113-SO-0-0.5	CFSB-113	0.00-0.50	8/31/2016	N	7.8	0.022	0.061	---	1.4	---
CFSB-115-SO-0-0.5	CFSB-115	0.00-0.50	8/31/2016	N	7.8	0.011	0.030	---	0.702	---
CFSB-116-SO-0-0.5	CFSB-116	0.00-0.50	7/22/2016	N	7.8	0.019	0.052	---	1.197	---
CFSB-118-SO-0-0.5	CFSB-118	0.00-0.50	7/21/2016	N	7.8	---	---	---	---	---
CFSB-149-SD-0-0.5	CFSB-149	0.00-0.50	11/7/2017	N	1.9	0.061	0.167	---	0.931	---
CFSB-150-SD-0-0.5	CFSB-150	0.00-0.50	11/7/2017	N	5.2	0.053	0.145	---	2.28	---
CFSB-151-SO-0-0.5	CFSB-151	0.00-0.50	11/7/2017	N	1.5	0.047	0.128	---	0.566	---
CFSB-152-SO-0-0.5	CFSB-152	0.00-0.50	11/7/2017	N	6.6	0.027	0.075	---	1.37	---
CFSB-153-SO-0-0.5	CFSB-153	0.00-0.50	11/6/2017	N	9.8	0.177	0.488	---	15.15	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	25.3	0.010	0.028	---	2.12	---

Table G-1
Summary of Equilibrium Partitioning Sediment Benchmark Toxicity Units for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth Interval (ft)	Sample Date	Sample Type	Percent TOC	Σ ESBTU ₁₃	Σ ESBTU ₃₄ (Estimated)	Σ ESBTU ₃₄	Total PAHs ₁₃ (mg/kg)	Total PAHs ₃₄ (mg/kg)
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	5.7	0.153	0.421	---	7.106	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	10.5	0.072	0.198	---	6.55	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	28.4	0.007	0.018	---	1.526	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	5.6	0.039	0.107	---	1.752	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	9.2	0.043	0.118	---	3.27	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	7.7	0.025	0.070	---	1.57	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	1.8	0.123	0.338	---	1.771	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	4.2	0.096	0.263	---	3.32	---
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	2.4	0.071	0.196	---	1.43	---
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	3.5	0.068	0.187	---	1.8947	---
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	4.3	0.077	0.211	---	2.736	---
Northern Surface Water Feature Area										
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	0.6	0.017	0.046	---	0.0778	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	2.3	0.007	0.019	---	0.132	---
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	2.4	0.014	0.038	---	0.261	---
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	12.9	0.008	0.021	---	0.786	---
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	16.2	0.006	0.015	---	0.725	---
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	16.1	0.005	0.014	---	0.672	---
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	5.1	0.008	0.021	---	0.309	---
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	5.7	0.014	0.039	---	0.6342	---
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	3.1	0.013	0.036	---	0.324	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	0.6	---	---	---	---	---
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	1.4	0.019	0.052	---	0.216	---
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	2.9	0.037	0.102	---	0.8768	---
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	2.0	0.011	0.030	---	0.173	---
North Percolation Pond Area										
CFMW-027-SO-0-0.5	CFMW-027	0.00-0.50	6/30/2016	N	14.7	20.819	57.253	---	2734.7	---
CFSB-014-SO-0-0.5	CFSB-014	0.00-0.50	6/2/2016	N	14.7	0.165	0.454	---	20.665	---
CFSB-016-SO-0-0.5	CFSB-016	0.00-0.50	6/2/2016	N	14.7	1.147	3.155	---	135.71	---
CFSB-019-SO-0-0.5	CFSB-019	0.00-0.50	6/4/2016	N	14.7	0.013	0.034	---	1.021	---
CFSB-025-SO-0-0.5	CFSB-025	0.00-0.50	6/13/2016	N	14.7	12.186	33.512	---	1555.3	---
CFSB-026-SO-0-0.5	CFSB-026	0.00-0.50	6/13/2016	N	14.7	10.756	29.580	---	1307.6	---
CFSB-027-SO-0-0.5	CFSB-027	0.00-0.50	6/13/2016	N	14.7	1.111	3.056	---	127.03	---
CFSB-028-SO-0-0.5	CFSB-028	0.00-0.50	7/18/2016	N	14.7	0.440	1.209	---	51.487	---
CFSB-030-SO-0-0.5	CFSB-030	0.00-0.50	6/13/2016	N	14.7	0.576	1.585	---	67.85	---
CFSB-199-SO-0-0.5	CFSB-199	0.00-0.50	6/28/2018	N	12.4	9.243	25.418	12.47	905	1282
CFSB-201-SO-0-0.5	CFSB-201	0.00-0.50	6/22/2018	N	2.4	1.307	3.594	2.11	25.72	44.47
CFSB-202-SO-0-0.5	CFSB-202	0.00-0.50	6/22/2018	N	2.9	4.034	11.093	6.29	99.98	164.3

Table G-1
Summary of Equilibrium Partitioning Sediment Benchmark Toxicity Units for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth Interval (ft)	Sample Date	Sample Type	Percent TOC	Σ ESBTU ₁₃	Σ ESBTU ₃₄ (Estimated)	Σ ESBTU ₃₄	Total PAHs ₁₃ (mg/kg)	Total PAHs ₃₄ (mg/kg)
CFSB-203-SO-0-0.5	CFSB-203	0.00-0.50	6/28/2018	N	18.2	72.289	198.794	110.33	22722	33642
CFSB-204-SO-0-0.5	CFSB-204	0.00-0.50	6/22/2018	N	5.7	6.160	16.940	---	286	---
CFSB-214-SO-0-0.5	CFSB-214	0.00-0.50	6/22/2018	N	12.9	0.421	1.159	0.59	42.37	62.72
CFSB-272-SO-0-0.5	CFSB-272	0.00-0.50	6/28/2018	N	14.7	60.942	167.590	92.71	14033	20958
CFSB-273-SO-0-0.5	CFSB-273	0.00-0.50	5/4/2018	N	8.4	26.445	72.724	---	1767.35	---
CFSB-279-SO-0-0.5	CFSB-279	0.00-0.50	6/22/2018	N	14.7	0.491	1.351	0.72	61.26	93.30
CFSB-280-SO-0-0.5	CFSB-280	0.00-0.50	6/22/2018	N	14.7	0.353	0.971	0.57	43.25	74.75
CFSB-281-SO-0-0.5	CFSB-281	0.00-0.50	5/4/2018	N	11.1	10.879	29.918	---	934.2	---
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	49.4	0.372	1.023	---	153.766	---
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	47.0	2.326	6.397	---	897.99	---
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	55.5	0.385	1.059	---	180.09	---
Flathead River Riparian Area										
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	0.5	0.063	0.174	0.08	0.2553	0.3479
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	0.2	1.451	3.991	---	2.511	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	1.0	0.036	0.099	---	0.277	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	1.4	0.060	0.164	---	0.705	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	3.7	0.041	0.112	---	1.1896	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	1.5	0.013	0.036	---	0.154	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	0.7	0.029	0.078	---	0.154	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	0.4	0.035	0.096	---	0.113	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	1.0	0.015	0.042	---	0.1255	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	0.3	0.172	0.473	---	0.439	---
Flathead River Area										
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	0.1	0.024	0.065	---	0.0148	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	0.9	---	---	---	---	---
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	0.8	0.010	0.028	---	0.0613	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	0.8	---	---	---	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	6.2	0.036	0.099	---	1.78	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	0.8	1.384	3.806	---	9.525	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	1.1	0.131	0.359	---	1.094	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	3.7	---	---	---	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	0.005	2.917	8.022	---	0.1053	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	2.6	0.020	0.054	---	0.393	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	2.7	---	---	---	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	0.6	0.208	0.572	0.27	0.9497	1.28
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	0.2	0.341	0.937	---	0.556	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	0.4	---	---	---	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	0.1	0.050	0.137	---	0.0234	---

Table G-1
Summary of Equilibrium Partitioning Sediment Benchmark Toxicity Units for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth Interval (ft)	Sample Date	Sample Type	Percent TOC	Σ ESBTU ₁₃	Σ ESBTU ₃₄ (Estimated)	Σ ESBTU ₃₄	Total PAHs ₁₃ (mg/kg)	Total PAHs ₃₄ (mg/kg)
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	0.005	0.260	0.716	---	0.00915	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	1.5	---	---	---	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	0.004	---	---	---	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	0.9	---	---	---	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	0.037	0.061	0.168	---	0.0165	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	0.8	---	---	---	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	1.0	2.526	6.947	3.24	19.16	25.33
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	0.5	0.417	1.147	---	1.601	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	1.8	0.189	0.518	0.25	2.81	3.83
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	4.5	0.802	2.207	---	27.812	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	0.5	1.483	4.079	1.84	5.40	6.88
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	1.8	0.068	0.186	---	0.948	---
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	0.6	0.016	0.043	---	0.0758	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	1.2	0.112	0.307	0.15	1.06	1.42
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	0.015	9.804	26.960	---	1.3526	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	0.005	---	---	---	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	0.005	0.186	0.512	---	0.0066	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	0.2	---	---	---	---	---

Notes:

---: Not applicable

FD: Duplicate Sample

mg/kg: milligram per kilogram

N: Normal (Primary) Sample

PAH: Polycyclic Aromatic Hydrocarbons

Σ ESBTU: Summation of congener-specific ESBTU values

Σ ESBTU₃₄ (Estimated): Σ ESBTU₃₄ value estimated by multiplying the Σ ESBTU₁₃ result by a conversion factor of 2.75

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
Cedar Creek Area												
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Acenaphthene	N	---	33400	491	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Acenaphthylene	N	---	24000	452	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Anthracene	N	---	1300	594	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Chrysene	Y	0.038	826	844	0.1600	0.24	0.0003
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Fluoranthene	Y	0.042	23870	707	0.1600	0.26	0.0004
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Fluorene	N	---	26000	538	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Naphthalene	N	---	61700	385	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Phenanthrene	Y	0.039	34300	596	0.1600	0.24	0.0004
CFSDP-014-SD	CFSDP-014	0.00-0.50	8/29/2016	N	Pyrene	N	---	9090	697	0.1600	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Acenaphthene	N	---	33400	491	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Acenaphthylene	N	---	24000	452	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Anthracene	N	---	1300	594	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Benzo(A)Anthracene	N	---	4153	841	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Benzo(A)Pyrene	N	---	3840	965	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Chrysene	Y	0.0061	826	844	0.0065	0.94	0.0011
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Fluoranthene	Y	0.0079	23870	707	0.0065	1.22	0.0017
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Fluorene	N	---	26000	538	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Naphthalene	N	---	61700	385	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Phenanthrene	N	---	34300	596	0.0065	---	---
CFSDP-014-SD	CFSDP-014	0.00-0.50	10/10/2018	N	Pyrene	Y	0.007	9090	697	0.0065	1.08	0.0015
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Acenaphthene	N	---	33400	491	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Acenaphthylene	N	---	24000	452	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Anthracene	N	---	1300	594	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Benzo(A)Pyrene	Y	0.043	3840	965	0.2660	0.16	0.0002
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Chrysene	Y	0.069	826	844	0.2660	0.26	0.0003
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Fluoranthene	Y	0.08	23870	707	0.2660	0.30	0.0004
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Fluorene	N	---	26000	538	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Naphthalene	N	---	61700	385	0.2660	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Phenanthrene	Y	0.072	34300	596	0.2660	0.27	0.0005
CFSDP-015-SD	CFSDP-015	0.00-0.50	8/29/2016	N	Pyrene	Y	0.069	9090	697	0.2660	0.26	0.0004
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Acenaphthene	N	---	33400	491	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Acenaphthylene	N	---	24000	452	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Anthracene	N	---	1300	594	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Benzo(A)Anthracene	N	---	4153	841	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Benzo(A)Pyrene	N	---	3840	965	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Chrysene	N	---	826	844	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Fluoranthene	Y	0.0023	23870	707	0.0021	1.09	0.0015

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Fluorene	N	---	26000	538	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Naphthalene	N	---	61700	385	0.0021	---	---
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Phenanthrene	Y	0.0028	34300	596	0.0021	1.33	0.0022
CFSDP-015-SD	CFSDP-015	0.00-0.50	10/9/2018	N	Pyrene	N	---	9090	697	0.0021	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Acenaphthene	N	---	33400	491	0.2770	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Acenaphthylene	N	---	24000	452	0.2770	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Anthracene	N	---	1300	594	0.2770	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Benzo(A)Anthracene	Y	0.12	4153	841	0.2770	0.43	0.0005
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Benzo(A)Pyrene	Y	0.094	3840	965	0.2770	0.34	0.0004
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Benzo(B)Fluoranthene	Y	0.12	2169	979	0.2770	0.43	0.0004
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.2770	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Chrysene	Y	0.13	826	844	0.2770	0.47	0.0006
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Fluoranthene	Y	0.19	23870	707	0.2770	0.69	0.0010
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Fluorene	N	---	26000	538	0.2770	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Naphthalene	N	---	61700	385	0.2770	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Phenanthrene	Y	0.17	34300	596	0.2770	0.61	0.0010
CFSDP-016-SD	CFSDP-016	0.00-0.50	8/29/2016	N	Pyrene	Y	0.16	9090	697	0.2770	0.58	0.0008
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Acenaphthene	Y	0.0058	33400	491	0.0195	0.30	0.0006
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Acenaphthylene	Y	0.011	24000	452	0.0195	0.56	0.0012
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Anthracene	Y	0.026	1300	594	0.0195	1.33	0.0022
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Benzo(A)Anthracene	Y	0.052	4153	841	0.0195	2.67	0.0032
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Benzo(A)Pyrene	Y	0.043	3840	965	0.0195	2.21	0.0023
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Benzo(B)Fluoranthene	Y	0.061	2169	979	0.0195	3.13	0.0032
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Benzo(K)Fluoranthene	Y	0.029	1220	981	0.0195	1.49	0.0015
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Chrysene	Y	0.085	826	844	0.0195	4.36	0.0052
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Fluoranthene	Y	0.12	23870	707	0.0195	6.15	0.0087
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Fluorene	Y	0.013	26000	538	0.0195	0.67	0.0012
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Naphthalene	N	---	61700	385	0.0195	---	---
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Phenanthrene	Y	0.1	34300	596	0.0195	5.13	0.0086
CFSDP-016-SD	CFSDP-016	0.00-0.50	10/9/2018	N	Pyrene	Y	0.095	9090	697	0.0195	4.87	0.0070
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Acenaphthene	N	---	33400	491	0.0018	---	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Acenaphthylene	N	---	24000	452	0.0018	---	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Anthracene	N	---	1300	594	0.0018	---	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Benzo(A)Anthracene	Y	0.0034	4153	841	0.0018	1.86	0.0022
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Benzo(A)Pyrene	Y	0.0032	3840	965	0.0018	1.75	0.0018
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Benzo(B)Fluoranthene	Y	0.0035	2169	979	0.0018	1.91	0.0020
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0018	---	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Chrysene	Y	0.0052	826	844	0.0018	2.84	0.0034
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Fluoranthene	Y	0.0063	23870	707	0.0018	3.44	0.0049
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Fluorene	N	---	26000	538	0.0018	---	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Naphthalene	N	---	61700	385	0.0018	---	---
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Phenanthrene	Y	0.0072	34300	596	0.0018	3.93	0.0066
CFSDP-025-SD	CFSDP-025	0.00-0.50	10/10/2018	N	Pyrene	Y	0.0058	9090	697	0.0018	3.17	0.0045
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Acenaphthene	N	---	33400	491	0.1080	---	---
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Acenaphthylene	Y	0.033	24000	452	0.1080	0.31	0.0007
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Anthracene	Y	0.051	1300	594	0.1080	0.47	0.0008
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Benzo(A)Anthracene	Y	0.091	4153	841	0.1080	0.84	0.0010
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Benzo(A)Pyrene	Y	0.094	3840	965	0.1080	0.87	0.0009
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Benzo(B)Fluoranthene	Y	0.096	2169	979	0.1080	0.89	0.0009

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Benzo(K)Fluoranthene	Y	0.04	1220	981	0.1080	0.37	0.0004
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Chrysene	Y	0.11	826	844	0.1080	1.02	0.0012
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Fluoranthene	Y	0.18	23870	707	0.1080	1.67	0.0024
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Fluorene	N	---	26000	538	0.1080	---	---
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Naphthalene	N	---	61700	385	0.1080	---	---
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Phenanthrene	Y	0.19	34300	596	0.1080	1.76	0.0030
CFSDP-044-SD	CFSDP-044	0.00-0.50	10/10/2018	N	Pyrene	Y	0.16	9090	697	0.1080	1.48	0.0021
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Acenaphthene	Y	0.011	33400	491	0.0024	4.60	0.0094
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Acenaphthylene	Y	0.022	24000	452	0.0024	9.21	0.0204
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Anthracene	Y	0.049	1300	594	0.0024	20.50	0.0345
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Benzo(A)Anthracene	Y	0.061	4153	841	0.0024	25.52	0.0303
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Benzo(A)Pyrene	Y	0.051	3840	965	0.0024	21.34	0.0221
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Benzo(B)Fluoranthene	Y	0.044	2169	979	0.0024	18.41	0.0188
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Benzo(K)Fluoranthene	Y	0.014	1220	981	0.0024	5.86	0.0060
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Chrysene	Y	0.072	826	844	0.0024	30.13	0.0357
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Fluoranthene	Y	0.12	23870	707	0.0024	50.21	0.0710
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Fluorene	Y	0.028	26000	538	0.0024	11.72	0.0218
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Naphthalene	N	---	61700	385	0.0024	---	---
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Phenanthrene	Y	0.21	34300	596	0.0024	87.87	0.1474
CFSDP-045-SD	CFSDP-045	0.00-0.50	10/9/2018	N	Pyrene	Y	0.11	9090	697	0.0024	46.03	0.0660
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Acenaphthene	N	---	33400	491	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Acenaphthylene	N	---	24000	452	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Anthracene	N	---	1300	594	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Benzo(A)Anthracene	Y	0.011	4153	841	0.0091	1.21	0.0014
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Benzo(A)Pyrene	N	---	3840	965	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Benzo(B)Fluoranthene	N	---	2169	979	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Benzo(K)Fluoranthene	N	---	1220	981	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Chrysene	Y	0.017	826	844	0.0091	1.86	0.0022
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Fluoranthene	Y	0.026	23870	707	0.0091	2.85	0.0040
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Fluorene	N	---	26000	538	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Naphthalene	N	---	61700	385	0.0091	---	---
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Phenanthrene	Y	0.017	34300	596	0.0091	1.86	0.0031
CFSDP-DUP4-SD	CFSDP-016	0.00-0.50	10/9/2018	FD	Pyrene	Y	0.021	9090	697	0.0091	2.30	0.0033
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Acenaphthene	N	---	33400	491	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Acenaphthylene	N	---	24000	452	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Anthracene	N	---	1300	594	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Benzo(A)Anthracene	N	---	4153	841	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Benzo(A)Pyrene	N	---	3840	965	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Benzo(B)Fluoranthene	N	---	2169	979	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Benzo(K)Fluoranthene	N	---	1220	981	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Chrysene	Y	0.0021	826	844	0.0023	0.93	0.0011
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Fluoranthene	Y	0.0023	23870	707	0.0023	1.02	0.0014
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Fluorene	N	---	26000	538	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Naphthalene	N	---	61700	385	0.0023	---	---
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Phenanthrene	Y	0.0034	34300	596	0.0023	1.51	0.0025
CFSDP-DUP5-SD	CFSDP-025	0.00-0.50	10/10/2018	FD	Pyrene	Y	0.0031	9090	697	0.0023	1.38	0.0020
Cedar Creek Reservoir Overflow Ditch Area												
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Acenaphthene	Y	0.034	33400	491	0.0286	1.19	0.0024
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Acenaphthylene	N	---	24000	452	0.0286	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Anthracene	Y	0.066	1300	594	0.0286	2.31	0.0039
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Benzo(A)Anthracene	Y	0.52	4153	841	0.0286	18.18	0.0216
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Benzo(A)Pyrene	Y	0.71	3840	965	0.0286	24.83	0.0257
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Benzo(B)Fluoranthene	Y	0.9	2169	979	0.0286	31.47	0.0321
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Benzo(K)Fluoranthene	Y	0.36	1220	981	0.0286	12.59	0.0128
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Chrysene	Y	0.8	826	844	0.0286	27.97	0.0331
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Fluoranthene	Y	0.96	23870	707	0.0286	33.57	0.0475
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Fluorene	Y	0.022	26000	538	0.0286	0.77	0.0014
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Naphthalene	Y	0.021	61700	385	0.0286	0.73	0.0019
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Phenanthrene	Y	0.45	34300	596	0.0286	15.73	0.0264
CFSB-282-SO-0-0	CFSB-282	0.00-0.50	6/16/2018	N	Pyrene	Y	0.87	9090	697	0.0286	30.42	0.0436
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Acenaphthene	Y	0.072	33400	491	0.0528	1.36	0.0028
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Acenaphthylene	N	---	24000	452	0.0528	---	---
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Anthracene	Y	0.14	1300	594	0.0528	2.65	0.0045
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Benzo(A)Anthracene	Y	1	4153	841	0.0528	18.94	0.0225
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Benzo(A)Pyrene	Y	1.4	3840	965	0.0528	26.52	0.0275
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Benzo(B)Fluoranthene	Y	1.7	2169	979	0.0528	32.20	0.0329
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Benzo(K)Fluoranthene	Y	0.75	1220	981	0.0528	14.20	0.0145
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Chrysene	Y	1.4	826	844	0.0528	26.52	0.0314
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Fluoranthene	Y	1.8	23870	707	0.0528	34.09	0.0482
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Fluorene	Y	0.042	26000	538	0.0528	0.80	0.0015
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Naphthalene	Y	0.024	61700	385	0.0528	0.45	0.0012
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Phenanthrene	Y	0.81	34300	596	0.0528	15.34	0.0257
CFSB-283-SO-0-0	CFSB-283	0.00-0.50	6/16/2018	N	Pyrene	Y	1.5	9090	697	0.0528	28.41	0.0408
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Acenaphthene	Y	0.061	33400	491	6.35E-05	960.63	1.9565
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Acenaphthylene	N	---	24000	452	6.35E-05	---	---
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Anthracene	Y	0.12	1300	594	6.35E-05	1889.76	2.1886
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Benzo(A)Anthracene	Y	0.6	4153	841	6.35E-05	9448.82	4.9382
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Benzo(A)Pyrene	Y	0.77	3840	965	6.35E-05	12125.98	3.9793
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Benzo(B)Fluoranthene	Y	1.3	2169	979	6.35E-05	20472.44	2.2155
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Benzo(K)Fluoranthene	Y	0.43	1220	981	6.35E-05	6771.65	1.2436
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Chrysene	Y	1.1	826	844	6.35E-05	17322.83	0.9787
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Fluoranthene	Y	1.2	23870	707	6.35E-05	18897.64	26.7293
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Fluorene	Y	0.037	26000	538	6.35E-05	582.68	1.0830
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Naphthalene	Y	0.045	61700	385	6.35E-05	708.66	1.8407
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Phenanthrene	Y	0.64	34300	596	6.35E-05	10078.74	16.9106
CFSB-284-SO-0-0	CFSB-284	0.00-0.50	6/16/2018	N	Pyrene	Y	1.1	9090	697	6.35E-05	17322.83	13.0416
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Acenaphthene	N	---	33400	491	0.0425	---	---
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.0425	---	---
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Anthracene	N	---	1300	594	0.0425	---	---
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	Y	0.1	4153	841	0.0425	2.35	0.0028
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	0.12	3840	965	0.0425	2.82	0.0029
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	0.21	2169	979	0.0425	4.94	0.0050
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	Y	0.069	1220	981	0.0425	1.62	0.0017
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Chrysene	Y	0.14	826	844	0.0425	3.29	0.0039
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Fluoranthene	Y	0.13	23870	707	0.0425	3.06	0.0043
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Fluorene	N	---	26000	538	0.0425	---	---
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Naphthalene	N	---	61700	385	0.0425	---	---
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.065	34300	596	0.0425	1.53	0.0026

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-009-SO	CFSDP-009	0.00-0.50	9/6/2016	N	Pyrene	Y	0.19	9090	697	0.0425	4.47	0.0064
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Acenaphthene	Y	0.043	33400	491	0.0922	0.47	0.0009
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.0922	---	---
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Anthracene	Y	0.082	1300	594	0.0922	0.89	0.0015
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	Y	0.82	4153	841	0.0922	8.89	0.0106
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	1.1	3840	965	0.0922	11.93	0.0124
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	1.8	2169	979	0.0922	19.52	0.0199
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	Y	0.47	1220	981	0.0922	5.10	0.0052
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Chrysene	Y	1.1	826	844	0.0922	11.93	0.0141
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Fluoranthene	Y	1.1	23870	707	0.0922	11.93	0.0169
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Fluorene	Y	0.028	26000	538	0.0922	0.30	0.0006
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Naphthalene	Y	0.013	61700	385	0.0922	0.14	0.0004
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.53	34300	596	0.0922	5.75	0.0096
CFSDP-010-SO	CFSDP-010	0.00-0.50	9/6/2016	N	Pyrene	Y	1.5	9090	697	0.0922	16.27	0.0233
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Acenaphthene	Y	0.075	33400	491	0.0515	1.46	0.0030
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.0515	---	---
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Anthracene	Y	0.14	1300	594	0.0515	2.72	0.0046
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	Y	0.74	4153	841	0.0515	14.37	0.0171
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	0.94	3840	965	0.0515	18.25	0.0189
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	1.3	2169	979	0.0515	25.24	0.0258
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	Y	0.49	1220	981	0.0515	9.51	0.0097
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Chrysene	Y	0.93	826	844	0.0515	18.06	0.0214
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Fluoranthene	Y	1.1	23870	707	0.0515	21.36	0.0302
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Fluorene	Y	0.053	26000	538	0.0515	1.03	0.0019
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Naphthalene	Y	0.02	61700	385	0.0515	0.39	0.0010
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.69	34300	596	0.0515	13.40	0.0225
CFSDP-011-SO	CFSDP-011	0.00-0.50	9/6/2016	N	Pyrene	Y	1.4	9090	697	0.0515	27.18	0.0390
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Acenaphthene	Y	0.046	33400	491	0.0615	0.75	0.0015
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.0615	---	---
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Anthracene	Y	0.096	1300	594	0.0615	1.56	0.0026
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	Y	0.64	4153	841	0.0615	10.41	0.0124
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	0.83	3840	965	0.0615	13.50	0.0140
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	1.2	2169	979	0.0615	19.51	0.0199
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	Y	0.45	1220	981	0.0615	7.32	0.0075
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Chrysene	Y	0.89	826	844	0.0615	14.47	0.0171
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Fluoranthene	Y	1	23870	707	0.0615	16.26	0.0230
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Fluorene	Y	0.03	26000	538	0.0615	0.49	0.0009
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Naphthalene	Y	0.013	61700	385	0.0615	0.21	0.0005
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.55	34300	596	0.0615	8.94	0.0150
CFSDP-012-SO	CFSDP-012	0.00-0.50	9/6/2016	N	Pyrene	Y	1.1	9090	697	0.0615	17.89	0.0257
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Acenaphthene	N	---	33400	491	0.1830	---	---
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.1830	---	---
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Anthracene	N	---	1300	594	0.1830	---	---
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	Y	0.093	4153	841	0.1830	0.51	0.0006
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	0.11	3840	965	0.1830	0.60	0.0006
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	0.19	2169	979	0.1830	1.04	0.0011
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	Y	0.051	1220	981	0.1830	0.28	0.0003
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Chrysene	Y	0.13	826	844	0.1830	0.71	0.0008
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Fluoranthene	Y	0.14	23870	707	0.1830	0.77	0.0011

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Fluorene	N	---	26000	538	0.1830	---	---
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Naphthalene	N	---	61700	385	0.1830	---	---
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.067	34300	596	0.1830	0.37	0.0006
CFSDP-013-SO	CFSDP-013	0.00-0.50	9/6/2016	N	Pyrene	Y	0.13	9090	697	0.1830	0.71	0.0010
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Acenaphthene	Y	0.037	33400	491	0.0610	0.61	0.0012
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Acenaphthylene	N	---	24000	452	0.0610	---	---
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Anthracene	Y	0.083	1300	594	0.0610	1.36	0.0023
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Benzo(A)Anthracene	Y	0.55	4153	841	0.0610	9.02	0.0107
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Benzo(A)Pyrene	Y	0.74	3840	965	0.0610	12.13	0.0126
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Benzo(B)Fluoranthene	Y	1.1	2169	979	0.0610	18.03	0.0184
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Benzo(K)Fluoranthene	Y	0.45	1220	981	0.0610	7.38	0.0075
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Chrysene	Y	0.82	826	844	0.0610	13.44	0.0159
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Fluoranthene	Y	0.92	23870	707	0.0610	15.08	0.0213
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Fluorene	Y	0.024	26000	538	0.0610	0.39	0.0007
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Naphthalene	Y	0.011	61700	385	0.0610	0.18	0.0005
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Phenanthrene	Y	0.49	34300	596	0.0610	8.03	0.0135
CFSDP-DUP1-SO	CFSDP-012	0.00-0.50	9/6/2016	FD	Pyrene	Y	1	9090	697	0.0610	16.39	0.0235
South Percolation Pond Area												
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Benzo(A)Anthracene	Y	0.042	4153	841	0.0785	0.54	0.0006
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0785	---	---
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Benzo(B)Fluoranthene	Y	0.084	2169	979	0.0785	1.07	0.0011
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Benzo(K)Fluoranthene	Y	0.022	1220	981	0.0785	0.28	0.0003
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Chrysene	Y	0.067	826	844	0.0785	0.85	0.0010
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Fluoranthene	Y	0.053	23870	707	0.0785	0.68	0.0010
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Phenanthrene	Y	0.037	34300	596	0.0785	0.47	0.0008
CFSB-101-SO-0-0	CFSB-101	0.00-0.50	7/21/2016	N	Pyrene	Y	0.058	9090	697	0.0785	0.74	0.0011
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Benzo(A)Anthracene	Y	0.11	4153	841	0.0785	1.40	0.0017
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Benzo(A)Pyrene	Y	0.13	3840	965	0.0785	1.66	0.0017
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Benzo(B)Fluoranthene	Y	0.22	2169	979	0.0785	2.80	0.0029
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Benzo(K)Fluoranthene	Y	0.079	1220	981	0.0785	1.01	0.0010
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Chrysene	Y	0.19	826	844	0.0785	2.42	0.0029
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Fluoranthene	Y	0.16	23870	707	0.0785	2.04	0.0029
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Phenanthrene	Y	0.075	34300	596	0.0785	0.96	0.0016
CFSB-102-SO-0-0	CFSB-102	0.00-0.50	7/13/2016	N	Pyrene	Y	0.18	9090	697	0.0785	2.29	0.0033
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Benzo(A)Anthracene	Y	0.18	4153	841	0.0785	2.29	0.0027
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Benzo(A)Pyrene	Y	0.25	3840	965	0.0785	3.19	0.0033

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Benzo(B)Fluoranthene	Y	0.35	2169	979	0.0785	4.46	0.0046
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Benzo(K)Fluoranthene	Y	0.15	1220	981	0.0785	1.91	0.0019
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Chrysene	Y	0.3	826	844	0.0785	3.82	0.0045
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Fluoranthene	Y	0.27	23870	707	0.0785	3.44	0.0049
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Phenanthrene	Y	0.14	34300	596	0.0785	1.78	0.0030
CFSB-104-SO-0-0	CFSB-104	0.00-0.50	7/13/2016	N	Pyrene	Y	0.32	9090	697	0.0785	4.08	0.0059
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Acenaphthene	Y	0.02	33400	491	0.0785	0.25	0.0005
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Benzo(A)Anthracene	Y	0.36	4153	841	0.0785	4.59	0.0055
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Benzo(A)Pyrene	Y	0.48	3840	965	0.0785	6.12	0.0063
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Benzo(B)Fluoranthene	Y	0.62	2169	979	0.0785	7.90	0.0081
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Benzo(K)Fluoranthene	Y	0.25	1220	981	0.0785	3.19	0.0032
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Chrysene	Y	0.55	826	844	0.0785	7.01	0.0083
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Fluoranthene	Y	0.56	23870	707	0.0785	7.14	0.0101
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Fluorene	Y	0.02	26000	538	0.0785	0.25	0.0005
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Phenanthrene	Y	0.27	34300	596	0.0785	3.44	0.0058
CFSB-109-SO-0-0	CFSB-109	0.00-0.50	7/13/2016	N	Pyrene	Y	0.57	9090	697	0.0785	7.27	0.0104
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Benzo(A)Anthracene	Y	0.18	4153	841	0.0785	2.29	0.0027
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Benzo(A)Pyrene	Y	0.23	3840	965	0.0785	2.93	0.0030
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Benzo(B)Fluoranthene	Y	0.29	2169	979	0.0785	3.70	0.0038
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Benzo(K)Fluoranthene	Y	0.12	1220	981	0.0785	1.53	0.0016
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Chrysene	Y	0.28	826	844	0.0785	3.57	0.0042
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Fluoranthene	Y	0.24	23870	707	0.0785	3.06	0.0043
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Phenanthrene	Y	0.12	34300	596	0.0785	1.53	0.0026
CFSB-110-SO-0-0	CFSB-110	0.00-0.50	7/14/2016	N	Pyrene	Y	0.23	9090	697	0.0785	2.93	0.0042
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Acenaphthene	Y	0.01	33400	491	0.0785	0.13	0.0003
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Benzo(A)Anthracene	Y	0.12	4153	841	0.0785	1.53	0.0018
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Benzo(A)Pyrene	Y	0.17	3840	965	0.0785	2.17	0.0022
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Benzo(B)Fluoranthene	Y	0.29	2169	979	0.0785	3.70	0.0038
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Benzo(K)Fluoranthene	Y	0.1	1220	981	0.0785	1.27	0.0013
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Chrysene	Y	0.19	826	844	0.0785	2.42	0.0029
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Fluoranthene	Y	0.2	23870	707	0.0785	2.55	0.0036
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Phenanthrene	Y	0.1	34300	596	0.0785	1.27	0.0021
CFSB-113-SO-0-0	CFSB-113	0.00-0.50	8/31/2016	N	Pyrene	Y	0.22	9090	697	0.0785	2.80	0.0040
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Benzo(A)Anthracene	Y	0.059	4153	841	0.0785	0.75	0.0009
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Benzo(A)Pyrene	Y	0.084	3840	965	0.0785	1.07	0.0011
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Benzo(B)Fluoranthene	Y	0.17	2169	979	0.0785	2.17	0.0022
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Benzo(K)Fluoranthene	Y	0.06	1220	981	0.0785	0.76	0.0008
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Chrysene	Y	0.1	826	844	0.0785	1.27	0.0015
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Fluoranthene	Y	0.089	23870	707	0.0785	1.13	0.0016
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Phenanthrene	Y	0.044	34300	596	0.0785	0.56	0.0009
CFSB-115-SO-0-0	CFSB-115	0.00-0.50	8/31/2016	N	Pyrene	Y	0.096	9090	697	0.0785	1.22	0.0018
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Benzo(A)Anthracene	Y	0.11	4153	841	0.0785	1.40	0.0017
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Benzo(A)Pyrene	Y	0.15	3840	965	0.0785	1.91	0.0020
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Benzo(B)Fluoranthene	Y	0.25	2169	979	0.0785	3.19	0.0033
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Benzo(K)Fluoranthene	Y	0.083	1220	981	0.0785	1.06	0.0011
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Chrysene	Y	0.17	826	844	0.0785	2.17	0.0026
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Fluoranthene	Y	0.16	23870	707	0.0785	2.04	0.0029
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Naphthalene	Y	0.015	61700	385	0.0785	0.19	0.0005
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Phenanthrene	Y	0.089	34300	596	0.0785	1.13	0.0019
CFSB-116-SO-0-0	CFSB-116	0.00-0.50	7/22/2016	N	Pyrene	Y	0.17	9090	697	0.0785	2.17	0.0031
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Acenaphthene	N	---	33400	491	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Acenaphthylene	N	---	24000	452	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Anthracene	N	---	1300	594	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Chrysene	N	---	826	844	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Fluoranthene	N	---	23870	707	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Fluorene	N	---	26000	538	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Naphthalene	N	---	61700	385	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Phenanthrene	N	---	34300	596	0.0785	---	---
CFSB-118-SO-0-0	CFSB-118	0.00-0.50	7/21/2016	N	Pyrene	N	---	9090	697	0.0785	---	---
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.0187	---	---
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.0187	---	---
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.0187	---	---
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.083	4153	841	0.0187	4.44	0.0053
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	Y	0.11	3840	965	0.0187	5.88	0.0061
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	Y	0.2	2169	979	0.0187	10.70	0.0109
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.076	1220	981	0.0187	4.06	0.0041
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Chrysene	Y	0.14	826	844	0.0187	7.49	0.0089
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Fluoranthene	Y	0.12	23870	707	0.0187	6.42	0.0091
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.0187	---	---
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.0187	---	---
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.062	34300	596	0.0187	3.32	0.0056

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-149-SD-0-0	CFSB-149	0.00-0.50	11/7/2017	N	Pyrene	Y	0.14	9090	697	0.0187	7.49	0.0107
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.0519	---	---
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.0519	---	---
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.0519	---	---
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.2	4153	841	0.0519	3.85	0.0046
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	Y	0.31	3840	965	0.0519	5.97	0.0062
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	Y	0.55	2169	979	0.0519	10.60	0.0108
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.19	1220	981	0.0519	3.66	0.0037
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Chrysene	Y	0.34	826	844	0.0519	6.55	0.0078
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Fluoranthene	Y	0.28	23870	707	0.0519	5.39	0.0076
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.0519	---	---
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.0519	---	---
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.15	34300	596	0.0519	2.89	0.0048
CFSB-150-SD-0-0	CFSB-150	0.00-0.50	11/7/2017	N	Pyrene	Y	0.26	9090	697	0.0519	5.01	0.0072
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.0151	---	---
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.0151	---	---
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.0151	---	---
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.053	4153	841	0.0151	3.51	0.0042
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	Y	0.059	3840	965	0.0151	3.91	0.0040
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	Y	0.11	2169	979	0.0151	7.28	0.0074
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.046	1220	981	0.0151	3.05	0.0031
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Chrysene	Y	0.067	826	844	0.0151	4.44	0.0053
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Fluoranthene	Y	0.094	23870	707	0.0151	6.23	0.0088
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.0151	---	---
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.0151	---	---
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.047	34300	596	0.0151	3.11	0.0052
CFSB-151-SO-0-0	CFSB-151	0.00-0.50	11/7/2017	N	Pyrene	Y	0.09	9090	697	0.0151	5.96	0.0086
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.2	4153	841	0.0657	3.04	0.0036
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	N	---	3840	965	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.14	1220	981	0.0657	2.13	0.0022
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Chrysene	Y	0.34	826	844	0.0657	5.18	0.0061
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Fluoranthene	Y	0.31	23870	707	0.0657	4.72	0.0067
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.0657	---	---
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.13	34300	596	0.0657	1.98	0.0033
CFSB-152-SO-0-0	CFSB-152	0.00-0.50	11/7/2017	N	Pyrene	Y	0.25	9090	697	0.0657	3.81	0.0055
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Acenaphthene	N	---	33400	491	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Acenaphthylene	N	---	24000	452	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Anthracene	N	---	1300	594	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Benzo(A)Pyrene	Y	2.8	3840	965	0.0978	28.63	0.0297
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Benzo(B)Fluoranthene	Y	6.6	2169	979	0.0978	67.48	0.0689
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Chrysene	Y	2.6	826	844	0.0978	26.58	0.0315
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Fluoranthene	Y	1.3	23870	707	0.0978	13.29	0.0188

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Fluorene	N	---	26000	538	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Naphthalene	N	---	61700	385	0.0978	---	---
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Phenanthrene	Y	0.55	34300	596	0.0978	5.62	0.0094
CFSB-153-SO-0-0	CFSB-153	0.00-0.50	11/6/2017	N	Pyrene	Y	1.3	9090	697	0.0978	13.29	0.0191
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Acenaphthene	N	---	33400	491	0.2530	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Acenaphthylene	N	---	24000	452	0.2530	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Anthracene	N	---	1300	594	0.2530	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Benzo(A)Anthracene	Y	0.21	4153	841	0.2530	0.83	0.0010
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Benzo(A)Pyrene	Y	0.26	3840	965	0.2530	1.03	0.0011
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Benzo(B)Fluoranthene	Y	0.37	2169	979	0.2530	1.46	0.0015
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Benzo(K)Fluoranthene	Y	0.17	1220	981	0.2530	0.67	0.0007
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Chrysene	Y	0.33	826	844	0.2530	1.30	0.0015
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Fluoranthene	Y	0.3	23870	707	0.2530	1.19	0.0017
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Fluorene	N	---	26000	538	0.2530	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Naphthalene	N	---	61700	385	0.2530	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Phenanthrene	Y	0.13	34300	596	0.2530	0.51	0.0009
CFSDP-018-SD	CFSDP-018	0.00-0.50	9/7/2016	N	Pyrene	Y	0.35	9090	697	0.2530	1.38	0.0020
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.1050	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.1050	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.1050	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.51	4153	841	0.1050	4.86	0.0058
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	Y	0.86	3840	965	0.1050	8.19	0.0085
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	Y	1.9	2169	979	0.1050	18.10	0.0185
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.64	1220	981	0.1050	6.10	0.0062
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Chrysene	Y	1.4	826	844	0.1050	13.33	0.0158
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Fluoranthene	Y	1	23870	707	0.1050	9.52	0.0135
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.1050	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.1050	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.24	34300	596	0.1050	2.29	0.0038
CFSDP-018-SD	CFSDP-018	0.00-0.50	11/7/2017	N	Pyrene	N	---	9090	697	0.1050	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Acenaphthene	N	---	33400	491	0.0565	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Acenaphthylene	N	---	24000	452	0.0565	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Anthracene	Y	0.096	1300	594	0.0565	1.70	0.0029
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Benzo(A)Anthracene	Y	0.57	4153	841	0.0565	10.09	0.0120
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Benzo(A)Pyrene	Y	0.78	3840	965	0.0565	13.81	0.0143
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Benzo(B)Fluoranthene	Y	1.4	2169	979	0.0565	24.78	0.0253
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Benzo(K)Fluoranthene	Y	0.61	1220	981	0.0565	10.80	0.0110
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Chrysene	Y	1.4	826	844	0.0565	24.78	0.0294
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Fluoranthene	Y	1.1	23870	707	0.0565	19.47	0.0275
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Fluorene	N	---	26000	538	0.0565	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Naphthalene	N	---	61700	385	0.0565	---	---
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Phenanthrene	Y	0.37	34300	596	0.0565	6.55	0.0110
CFSDP-018-SD	CFSDP-018	0.00-0.50	10/17/2018	N	Pyrene	Y	0.78	9090	697	0.0565	13.81	0.0198
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Acenaphthene	N	---	33400	491	0.2840	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Acenaphthylene	N	---	24000	452	0.2840	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Anthracene	N	---	1300	594	0.2840	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Benzo(A)Anthracene	Y	0.16	4153	841	0.2840	0.56	0.0007
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Benzo(A)Pyrene	Y	0.19	3840	965	0.2840	0.67	0.0007
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Benzo(B)Fluoranthene	Y	0.27	2169	979	0.2840	0.95	0.0010

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Benzo(K)Fluoranthene	Y	0.086	1220	981	0.2840	0.30	0.0003
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Chrysene	Y	0.23	826	844	0.2840	0.81	0.0010
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Fluoranthene	Y	0.23	23870	707	0.2840	0.81	0.0011
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Fluorene	N	---	26000	538	0.2840	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Naphthalene	N	---	61700	385	0.2840	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Phenanthrene	Y	0.11	34300	596	0.2840	0.39	0.0006
CFSDP-019-SD	CFSDP-019	0.00-0.50	9/7/2016	N	Pyrene	Y	0.25	9090	697	0.2840	0.88	0.0013
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.0915	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.0915	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.0915	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.31	4153	841	0.0915	3.39	0.0040
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	Y	0.48	3840	965	0.0915	5.25	0.0054
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	Y	0.76	2169	979	0.0915	8.31	0.0085
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.22	1220	981	0.0915	2.40	0.0025
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Chrysene	Y	0.52	826	844	0.0915	5.68	0.0067
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Fluoranthene	Y	0.41	23870	707	0.0915	4.48	0.0063
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.0915	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.0915	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.22	34300	596	0.0915	2.40	0.0040
CFSDP-019-SD	CFSDP-019	0.00-0.50	11/7/2017	N	Pyrene	Y	0.35	9090	697	0.0915	3.83	0.0055
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Acenaphthene	N	---	33400	491	0.0561	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Acenaphthylene	N	---	24000	452	0.0561	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Anthracene	Y	0.03	1300	594	0.0561	0.53	0.0009
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Benzo(A)Anthracene	Y	0.16	4153	841	0.0561	2.85	0.0034
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Benzo(A)Pyrene	Y	0.21	3840	965	0.0561	3.74	0.0039
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Benzo(B)Fluoranthene	Y	0.33	2169	979	0.0561	5.88	0.0060
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Benzo(K)Fluoranthene	Y	0.092	1220	981	0.0561	1.64	0.0017
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Chrysene	Y	0.25	826	844	0.0561	4.46	0.0053
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Fluoranthene	Y	0.3	23870	707	0.0561	5.35	0.0076
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Fluorene	N	---	26000	538	0.0561	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Naphthalene	N	---	61700	385	0.0561	---	---
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Phenanthrene	Y	0.14	34300	596	0.0561	2.50	0.0042
CFSDP-019-SD	CFSDP-019	0.00-0.50	10/16/2018	N	Pyrene	Y	0.24	9090	697	0.0561	4.28	0.0061
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Acenaphthene	N	---	33400	491	0.0765	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Acenaphthylene	N	---	24000	452	0.0765	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Anthracene	N	---	1300	594	0.0765	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Benzo(A)Anthracene	Y	0.15	4153	841	0.0765	1.96	0.0023
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Benzo(A)Pyrene	Y	0.19	3840	965	0.0765	2.48	0.0026
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Benzo(B)Fluoranthene	Y	0.28	2169	979	0.0765	3.66	0.0037
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Benzo(K)Fluoranthene	Y	0.11	1220	981	0.0765	1.44	0.0015
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Chrysene	Y	0.23	826	844	0.0765	3.01	0.0036
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Fluoranthene	Y	0.21	23870	707	0.0765	2.75	0.0039
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Fluorene	N	---	26000	538	0.0765	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Naphthalene	N	---	61700	385	0.0765	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Phenanthrene	Y	0.11	34300	596	0.0765	1.44	0.0024
CFSDP-020-SD	CFSDP-020	0.00-0.50	9/7/2016	N	Pyrene	Y	0.29	9090	697	0.0765	3.79	0.0054
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Acenaphthene	N	---	33400	491	0.0421	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Acenaphthylene	N	---	24000	452	0.0421	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Anthracene	N	---	1300	594	0.0421	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Benzo(A)Anthracene	Y	0.31	4153	841	0.0421	7.36	0.0088
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Benzo(A)Pyrene	Y	0.48	3840	965	0.0421	11.40	0.0118
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Benzo(B)Fluoranthene	Y	0.71	2169	979	0.0421	16.86	0.0172
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Benzo(K)Fluoranthene	Y	0.26	1220	981	0.0421	6.18	0.0063
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Chrysene	Y	0.47	826	844	0.0421	11.16	0.0132
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Fluoranthene	Y	0.44	23870	707	0.0421	10.45	0.0148
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Fluorene	N	---	26000	538	0.0421	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Naphthalene	N	---	61700	385	0.0421	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Phenanthrene	Y	0.23	34300	596	0.0421	5.46	0.0092
CFSDP-020-SD	CFSDP-020	0.00-0.50	11/7/2017	N	Pyrene	Y	0.42	9090	697	0.0421	9.98	0.0143
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Acenaphthene	N	---	33400	491	0.0179	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Acenaphthylene	N	---	24000	452	0.0179	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Anthracene	Y	0.021	1300	594	0.0179	1.17	0.0020
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Benzo(A)Anthracene	Y	0.15	4153	841	0.0179	8.38	0.0100
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Benzo(A)Pyrene	Y	0.23	3840	965	0.0179	12.85	0.0133
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Benzo(B)Fluoranthene	Y	0.3	2169	979	0.0179	16.76	0.0171
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Benzo(K)Fluoranthene	Y	0.14	1220	981	0.0179	7.82	0.0080
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Chrysene	Y	0.25	826	844	0.0179	13.97	0.0165
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Fluoranthene	Y	0.3	23870	707	0.0179	16.76	0.0237
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Fluorene	N	---	26000	538	0.0179	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Naphthalene	N	---	61700	385	0.0179	---	---
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Phenanthrene	Y	0.13	34300	596	0.0179	7.26	0.0122
CFSDP-020-SD	CFSDP-020	0.00-0.50	10/11/2018	N	Pyrene	Y	0.25	9090	697	0.0179	13.97	0.0200
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Acenaphthene	N	---	33400	491	0.0243	---	---
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Acenaphthylene	N	---	24000	452	0.0243	---	---
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Anthracene	N	---	1300	594	0.0243	---	---
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Benzo(A)Anthracene	Y	0.11	4153	841	0.0243	4.53	0.0054
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Benzo(A)Pyrene	Y	0.17	3840	965	0.0243	7.00	0.0072
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Benzo(B)Fluoranthene	Y	0.31	2169	979	0.0243	12.76	0.0130
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Benzo(K)Fluoranthene	Y	0.12	1220	981	0.0243	4.94	0.0050
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Chrysene	Y	0.25	826	844	0.0243	10.29	0.0122
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Fluoranthene	Y	0.21	23870	707	0.0243	8.64	0.0122
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Fluorene	N	---	26000	538	0.0243	---	---
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Naphthalene	N	---	61700	385	0.0243	---	---
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Phenanthrene	Y	0.09	34300	596	0.0243	3.70	0.0062
CFSDP-058-SD	CFSDP-058	0.00-0.50	10/11/2018	N	Pyrene	Y	0.17	9090	697	0.0243	7.00	0.0100
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Acenaphthene	Y	0.012	33400	491	0.0346	0.35	0.0007
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Acenaphthylene	N	---	24000	452	0.0346	---	---
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Anthracene	Y	0.024	1300	594	0.0346	0.69	0.0012
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Benzo(A)Anthracene	Y	0.16	4153	841	0.0346	4.62	0.0055
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Benzo(A)Pyrene	Y	0.24	3840	965	0.0346	6.94	0.0072
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Benzo(B)Fluoranthene	Y	0.37	2169	979	0.0346	10.69	0.0109
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Benzo(K)Fluoranthene	Y	0.11	1220	981	0.0346	3.18	0.0032
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Chrysene	Y	0.29	826	844	0.0346	8.38	0.0099
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Fluoranthene	Y	0.3	23870	707	0.0346	8.67	0.0123
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Fluorene	Y	0.0087	26000	538	0.0346	0.25	0.0005
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Naphthalene	N	---	61700	385	0.0346	---	---
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Phenanthrene	Y	0.13	34300	596	0.0346	3.76	0.0063
CFSDP-059-SD	CFSDP-059	0.00-0.50	10/11/2018	N	Pyrene	Y	0.25	9090	697	0.0346	7.23	0.0104

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Acenaphthene	N	---	33400	491	0.0430	---	---
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Acenaphthylene	N	---	24000	452	0.0430	---	---
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Anthracene	Y	0.036	1300	594	0.0430	0.84	0.0014
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Benzo(A)Anthracene	Y	0.21	4153	841	0.0430	4.88	0.0058
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Benzo(A)Pyrene	Y	0.37	3840	965	0.0430	8.60	0.0089
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Benzo(B)Fluoranthene	Y	0.65	2169	979	0.0430	15.12	0.0154
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Benzo(K)Fluoranthene	Y	0.24	1220	981	0.0430	5.58	0.0057
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Chrysene	Y	0.41	826	844	0.0430	9.53	0.0113
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Fluoranthene	Y	0.35	23870	707	0.0430	8.14	0.0115
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Fluorene	N	---	26000	538	0.0430	---	---
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Naphthalene	N	---	61700	385	0.0430	---	---
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Phenanthrene	Y	0.17	34300	596	0.0430	3.95	0.0066
CFSDP-060-SD	CFSDP-060	0.00-0.50	10/16/2018	N	Pyrene	Y	0.3	9090	697	0.0430	6.98	0.0100
Northern Surface Water Feature Area												
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Acenaphthene	N	---	33400	491	0.0058	---	---
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Acenaphthylene	N	---	24000	452	0.0058	---	---
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Anthracene	N	---	1300	594	0.0058	---	---
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Benzo(A)Anthracene	Y	0.0061	4153	841	0.0058	1.05	0.0012
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Benzo(A)Pyrene	Y	0.007	3840	965	0.0058	1.20	0.0012
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Benzo(B)Fluoranthene	Y	0.015	2169	979	0.0058	2.58	0.0026
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Benzo(K)Fluoranthene	Y	0.0039	1220	981	0.0058	0.67	0.0007
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Chrysene	Y	0.016	826	844	0.0058	2.75	0.0033
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Fluoranthene	Y	0.013	23870	707	0.0058	2.24	0.0032
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Fluorene	N	---	26000	538	0.0058	---	---
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Naphthalene	N	---	61700	385	0.0058	---	---
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Phenanthrene	Y	0.0058	34300	596	0.0058	1.00	0.0017
CFSDP-021-SD	CFSDP-021	0.00-0.50	6/19/2018	N	Pyrene	Y	0.011	9090	697	0.0058	1.89	0.0027
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Acenaphthene	N	---	33400	491	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Anthracene	N	---	1300	594	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	0.021	3840	965	0.0232	0.91	0.0009
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	0.036	2169	979	0.0232	1.55	0.0016
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Chrysene	Y	0.019	826	844	0.0232	0.82	0.0010
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Fluoranthene	Y	0.018	23870	707	0.0232	0.78	0.0011
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Fluorene	N	---	26000	538	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Naphthalene	N	---	61700	385	0.0232	---	---
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.011	34300	596	0.0232	0.47	0.0008
CFSDP-021-SO	CFSDP-021	0.00-0.50	9/6/2016	N	Pyrene	Y	0.027	9090	697	0.0232	1.16	0.0017
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Acenaphthene	N	---	33400	491	0.0238	---	---
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Acenaphthylene	N	---	24000	452	0.0238	---	---
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Anthracene	N	---	1300	594	0.0238	---	---
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Benzo(A)Anthracene	Y	0.021	4153	841	0.0238	0.88	0.0010
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Benzo(A)Pyrene	Y	0.023	3840	965	0.0238	0.97	0.0010
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Benzo(B)Fluoranthene	Y	0.038	2169	979	0.0238	1.60	0.0016
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Benzo(K)Fluoranthene	Y	0.019	1220	981	0.0238	0.80	0.0008
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Chrysene	Y	0.054	826	844	0.0238	2.27	0.0027
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Fluoranthene	Y	0.047	23870	707	0.0238	1.97	0.0028

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Fluorene	N	---	26000	538	0.0238	---	---
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Naphthalene	N	---	61700	385	0.0238	---	---
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Phenanthrene	Y	0.018	34300	596	0.0238	0.76	0.0013
CFSDP-022-SD	CFSDP-022	0.00-0.50	6/20/2018	N	Pyrene	Y	0.041	9090	697	0.0238	1.72	0.0025
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Acenaphthene	N	---	33400	491	0.1290	---	---
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Acenaphthylene	N	---	24000	452	0.1290	---	---
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Anthracene	N	---	1300	594	0.1290	---	---
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Benzo(A)Anthracene	Y	0.074	4153	841	0.1290	0.57	0.0007
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Benzo(A)Pyrene	Y	0.091	3840	965	0.1290	0.71	0.0007
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Benzo(B)Fluoranthene	Y	0.15	2169	979	0.1290	1.16	0.0012
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Benzo(K)Fluoranthene	Y	0.053	1220	981	0.1290	0.41	0.0004
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Chrysene	Y	0.13	826	844	0.1290	1.01	0.0012
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Fluoranthene	Y	0.12	23870	707	0.1290	0.93	0.0013
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Fluorene	N	---	26000	538	0.1290	---	---
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Naphthalene	N	---	61700	385	0.1290	---	---
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Phenanthrene	Y	0.058	34300	596	0.1290	0.45	0.0008
CFSDP-022-SO	CFSDP-022	0.00-0.50	9/6/2016	N	Pyrene	Y	0.11	9090	697	0.1290	0.85	0.0012
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Acenaphthene	N	---	33400	491	0.1620	---	---
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Acenaphthylene	N	---	24000	452	0.1620	---	---
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Anthracene	N	---	1300	594	0.1620	---	---
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Benzo(A)Anthracene	Y	0.069	4153	841	0.1620	0.43	0.0005
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Benzo(A)Pyrene	Y	0.086	3840	965	0.1620	0.53	0.0006
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Benzo(B)Fluoranthene	Y	0.13	2169	979	0.1620	0.80	0.0008
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Benzo(K)Fluoranthene	Y	0.045	1220	981	0.1620	0.28	0.0003
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Chrysene	Y	0.1	826	844	0.1620	0.62	0.0007
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Fluoranthene	Y	0.11	23870	707	0.1620	0.68	0.0010
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Fluorene	N	---	26000	538	0.1620	---	---
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Naphthalene	N	---	61700	385	0.1620	---	---
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Phenanthrene	Y	0.085	34300	596	0.1620	0.52	0.0009
CFSDP-046-SD	CFSDP-046	0.00-0.50	6/19/2018	N	Pyrene	Y	0.1	9090	697	0.1620	0.62	0.0009
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Acenaphthene	N	---	33400	491	0.1610	---	---
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Acenaphthylene	N	---	24000	452	0.1610	---	---
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Anthracene	Y	0.012	1300	594	0.1610	0.07	0.0001
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Benzo(A)Anthracene	Y	0.057	4153	841	0.1610	0.35	0.0004
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Benzo(A)Pyrene	Y	0.083	3840	965	0.1610	0.52	0.0005
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Benzo(B)Fluoranthene	Y	0.11	2169	979	0.1610	0.68	0.0007
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Benzo(K)Fluoranthene	Y	0.047	1220	981	0.1610	0.29	0.0003
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Chrysene	Y	0.092	826	844	0.1610	0.57	0.0007
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Fluoranthene	Y	0.11	23870	707	0.1610	0.68	0.0010
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Fluorene	N	---	26000	538	0.1610	---	---
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Naphthalene	N	---	61700	385	0.1610	---	---
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Phenanthrene	Y	0.069	34300	596	0.1610	0.43	0.0007
CFSDP-047-SD	CFSDP-047	0.00-0.50	6/19/2018	N	Pyrene	Y	0.092	9090	697	0.1610	0.57	0.0008
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Acenaphthene	N	---	33400	491	0.0512	---	---
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Acenaphthylene	N	---	24000	452	0.0512	---	---
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Anthracene	N	---	1300	594	0.0512	---	---
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Benzo(A)Anthracene	Y	0.025	4153	841	0.0512	0.49	0.0006
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Benzo(A)Pyrene	Y	0.033	3840	965	0.0512	0.64	0.0007
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Benzo(B)Fluoranthene	Y	0.041	2169	979	0.0512	0.80	0.0008

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Benzo(K)Fluoranthene	Y	0.024	1220	981	0.0512	0.47	0.0005
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Chrysene	Y	0.044	826	844	0.0512	0.86	0.0010
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Fluoranthene	Y	0.051	23870	707	0.0512	1.00	0.0014
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Fluorene	N	---	26000	538	0.0512	---	---
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Naphthalene	N	---	61700	385	0.0512	---	---
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Phenanthrene	Y	0.045	34300	596	0.0512	0.88	0.0015
CFSDP-048-SD	CFSDP-048	0.00-0.50	6/20/2018	N	Pyrene	Y	0.046	9090	697	0.0512	0.90	0.0013
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Acenaphthene	N	---	33400	491	0.0570	---	---
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Acenaphthylene	N	---	24000	452	0.0570	---	---
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Anthracene	Y	0.013	1300	594	0.0570	0.23	0.0004
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Benzo(A)Anthracene	Y	0.052	4153	841	0.0570	0.91	0.0011
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Benzo(A)Pyrene	Y	0.079	3840	965	0.0570	1.39	0.0014
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Benzo(B)Fluoranthene	Y	0.11	2169	979	0.0570	1.93	0.0020
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Benzo(K)Fluoranthene	Y	0.043	1220	981	0.0570	0.75	0.0008
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Chrysene	Y	0.084	826	844	0.0570	1.47	0.0017
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Fluoranthene	Y	0.1	23870	707	0.0570	1.75	0.0025
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Fluorene	Y	0.0062	26000	538	0.0570	0.11	0.0002
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Naphthalene	N	---	61700	385	0.0570	---	---
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Phenanthrene	Y	0.06	34300	596	0.0570	1.05	0.0018
CFSDP-049-SD	CFSDP-049	0.00-0.50	6/20/2018	N	Pyrene	Y	0.087	9090	697	0.0570	1.53	0.0022
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Acenaphthene	N	---	33400	491	0.0311	---	---
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Acenaphthylene	N	---	24000	452	0.0311	---	---
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Anthracene	N	---	1300	594	0.0311	---	---
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Benzo(A)Anthracene	Y	0.028	4153	841	0.0311	0.90	0.0011
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Benzo(A)Pyrene	Y	0.036	3840	965	0.0311	1.16	0.0012
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Benzo(B)Fluoranthene	Y	0.052	2169	979	0.0311	1.67	0.0017
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Benzo(K)Fluoranthene	Y	0.028	1220	981	0.0311	0.90	0.0009
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Chrysene	Y	0.048	826	844	0.0311	1.54	0.0018
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Fluoranthene	Y	0.055	23870	707	0.0311	1.77	0.0025
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Fluorene	N	---	26000	538	0.0311	---	---
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Naphthalene	N	---	61700	385	0.0311	---	---
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Phenanthrene	Y	0.028	34300	596	0.0311	0.90	0.0015
CFSDP-050-SD	CFSDP-050	0.00-0.50	6/21/2018	N	Pyrene	Y	0.049	9090	697	0.0311	1.58	0.0023
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Acenaphthene	N	---	33400	491	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Acenaphthylene	N	---	24000	452	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Anthracene	N	---	1300	594	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Benzo(A)Anthracene	N	---	4153	841	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Benzo(A)Pyrene	N	---	3840	965	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Chrysene	N	---	826	844	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Fluoranthene	N	---	23870	707	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Fluorene	N	---	26000	538	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Naphthalene	N	---	61700	385	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Phenanthrene	N	---	34300	596	0.0058	---	---
CFSDP-051-SD	CFSDP-051	0.00-0.50	6/21/2018	N	Pyrene	N	---	9090	697	0.0058	---	---
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Acenaphthene	N	---	33400	491	0.0144	---	---
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Acenaphthylene	N	---	24000	452	0.0144	---	---
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Anthracene	N	---	1300	594	0.0144	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Benzo(A)Anthracene	Y	0.019	4153	841	0.0144	1.32	0.0016
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Benzo(A)Pyrene	Y	0.024	3840	965	0.0144	1.67	0.0017
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Benzo(B)Fluoranthene	Y	0.031	2169	979	0.0144	2.15	0.0022
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Benzo(K)Fluoranthene	Y	0.017	1220	981	0.0144	1.18	0.0012
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Chrysene	Y	0.03	826	844	0.0144	2.08	0.0025
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Fluoranthene	Y	0.039	23870	707	0.0144	2.71	0.0038
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Fluorene	N	---	26000	538	0.0144	---	---
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Naphthalene	N	---	61700	385	0.0144	---	---
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Phenanthrene	Y	0.026	34300	596	0.0144	1.81	0.0030
CFSDP-052-SD	CFSDP-052	0.00-0.50	6/18/2018	N	Pyrene	Y	0.03	9090	697	0.0144	2.08	0.0030
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Acenaphthene	N	---	33400	491	0.0292	---	---
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Acenaphthylene	N	---	24000	452	0.0292	---	---
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Anthracene	Y	0.0098	1300	594	0.0292	0.34	0.0006
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Benzo(A)Anthracene	Y	0.062	4153	841	0.0292	2.12	0.0025
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Benzo(A)Pyrene	Y	0.071	3840	965	0.0292	2.43	0.0025
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Benzo(B)Fluoranthene	Y	0.16	2169	979	0.0292	5.48	0.0056
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Benzo(K)Fluoranthene	Y	0.057	1220	981	0.0292	1.95	0.0020
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Chrysene	Y	0.2	826	844	0.0292	6.85	0.0081
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Fluoranthene	Y	0.15	23870	707	0.0292	5.14	0.0073
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Fluorene	N	---	26000	538	0.0292	---	---
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Naphthalene	N	---	61700	385	0.0292	---	---
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Phenanthrene	Y	0.047	34300	596	0.0292	1.61	0.0027
CFSDP-053-SD	CFSDP-053	0.00-0.50	6/18/2018	N	Pyrene	Y	0.12	9090	697	0.0292	4.11	0.0059
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Acenaphthene	N	---	33400	491	0.0198	---	---
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Acenaphthylene	N	---	24000	452	0.0198	---	---
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Anthracene	N	---	1300	594	0.0198	---	---
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Benzo(A)Anthracene	Y	0.015	4153	841	0.0198	0.76	0.0009
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Benzo(A)Pyrene	Y	0.018	3840	965	0.0198	0.91	0.0009
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Benzo(B)Fluoranthene	Y	0.029	2169	979	0.0198	1.46	0.0015
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Benzo(K)Fluoranthene	Y	0.011	1220	981	0.0198	0.56	0.0006
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Chrysene	Y	0.03	826	844	0.0198	1.52	0.0018
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Fluoranthene	Y	0.029	23870	707	0.0198	1.46	0.0021
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Fluorene	N	---	26000	538	0.0198	---	---
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Naphthalene	N	---	61700	385	0.0198	---	---
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Phenanthrene	Y	0.016	34300	596	0.0198	0.81	0.0014
CFSDP-DUP3-SD	CFSDP-050	0.00-0.50	6/21/2018	FD	Pyrene	Y	0.025	9090	697	0.0198	1.26	0.0018
North Percolation Pond Area												
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Acenaphthene	Y	40	33400	491	0.1471	271.97	0.5539
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Acenaphthylene	Y	1.2	24000	452	0.1471	8.16	0.0181
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Anthracene	Y	41	1300	594	0.1471	278.77	0.4693
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Benzo(A)Anthracene	Y	280	4153	841	0.1471	1903.77	2.2637
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Benzo(A)Pyrene	Y	320	3840	965	0.1471	2175.73	2.2546
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Benzo(B)Fluoranthene	Y	460	2169	979	0.1471	3127.62	2.2155
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Benzo(K)Fluoranthene	Y	150	1220	981	0.1471	1019.87	1.0396
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Chrysene	Y	350	826	844	0.1471	2379.71	0.9787
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Fluoranthene	Y	430	23870	707	0.1471	2923.64	4.1353
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Fluorene	Y	16	26000	538	0.1471	108.79	0.2022
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Naphthalene	Y	6.5	61700	385	0.1471	44.19	0.1148
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Phenanthrene	Y	200	34300	596	0.1471	1359.83	2.2816

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFMW-027-SO-0-	CFMW-027	0.00-0.50	6/30/2016	N	Pyrene	Y	440	9090	697	0.1471	2991.63	4.2922
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Acenaphthene	Y	0.031	33400	491	0.1471	0.21	0.0004
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Anthracene	Y	0.13	1300	594	0.1471	0.88	0.0015
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Benzo(A)Anthracene	Y	1.7	4153	841	0.1471	11.56	0.0137
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Benzo(A)Pyrene	Y	2	3840	965	0.1471	13.60	0.0141
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Benzo(B)Fluoranthene	Y	6.8	2169	979	0.1471	46.23	0.0472
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Benzo(K)Fluoranthene	Y	2.4	1220	981	0.1471	16.32	0.0166
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Chrysene	Y	2.3	826	844	0.1471	15.64	0.0185
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Fluoranthene	Y	2.3	23870	707	0.1471	15.64	0.0221
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Fluorene	Y	0.012	26000	538	0.1471	0.08	0.0002
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Naphthalene	Y	0.042	61700	385	0.1471	0.29	0.0007
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Phenanthrene	Y	0.65	34300	596	0.1471	4.42	0.0074
CFSB-014-SO-0-0	CFSB-014	0.00-0.50	6/2/2016	N	Pyrene	Y	2.3	9090	697	0.1471	15.64	0.0224
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Acenaphthene	Y	0.72	33400	491	0.1471	4.90	0.0100
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Anthracene	Y	1.9	1300	594	0.1471	12.92	0.0217
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Benzo(A)Anthracene	Y	11	4153	841	0.1471	74.79	0.0889
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Benzo(A)Pyrene	Y	14	3840	965	0.1471	95.19	0.0986
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Benzo(B)Fluoranthene	Y	30	2169	979	0.1471	203.97	0.2084
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Benzo(K)Fluoranthene	Y	12	1220	981	0.1471	81.59	0.0832
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Chrysene	Y	16	826	844	0.1471	108.79	0.1289
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Fluoranthene	Y	19	23870	707	0.1471	129.18	0.1827
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Fluorene	Y	0.37	26000	538	0.1471	2.52	0.0047
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Naphthalene	Y	0.72	61700	385	0.1471	4.90	0.0127
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Phenanthrene	Y	9	34300	596	0.1471	61.19	0.1027
CFSB-016-SO-0-0	CFSB-016	0.00-0.50	6/2/2016	N	Pyrene	Y	21	9090	697	0.1471	142.78	0.2049
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Acenaphthene	Y	0.069	33400	491	0.1471	0.47	0.0010
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Acenaphthylene	Y	0.033	24000	452	0.1471	0.22	0.0005
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Anthracene	Y	0.049	1300	594	0.1471	0.33	0.0006
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.1471	---	---
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.1471	---	---
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.1471	---	---
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.1471	---	---
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Chrysene	N	---	826	844	0.1471	---	---
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Fluoranthene	Y	0.029	23870	707	0.1471	0.20	0.0003
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Fluorene	Y	0.19	26000	538	0.1471	1.29	0.0024
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Naphthalene	Y	0.083	61700	385	0.1471	0.56	0.0015
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Phenanthrene	Y	0.51	34300	596	0.1471	3.47	0.0058
CFSB-019-SO-0-0	CFSB-019	0.00-0.50	6/4/2016	N	Pyrene	Y	0.058	9090	697	0.1471	0.39	0.0006
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Acenaphthene	Y	5.3	33400	491	0.1471	36.04	0.0734
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Anthracene	Y	38	1300	594	0.1471	258.37	0.4350
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Benzo(A)Anthracene	Y	190	4153	841	0.1471	1291.84	1.5361
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Benzo(A)Pyrene	Y	140	3840	965	0.1471	951.88	0.9864
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Benzo(B)Fluoranthene	Y	210	2169	979	0.1471	1427.82	1.4585
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Benzo(K)Fluoranthene	Y	78	1220	981	0.1471	530.33	0.5406
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Chrysene	Y	270	826	844	0.1471	1835.77	0.9787
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Fluoranthene	Y	320	23870	707	0.1471	2175.73	3.0774

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Fluorene	Y	4.2	26000	538	0.1471	28.56	0.0531
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Naphthalene	Y	3.8	61700	385	0.1471	25.84	0.0671
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Phenanthrene	Y	56	34300	596	0.1471	380.75	0.6388
CFSB-025-SO-0-0	CFSB-025	0.00-0.50	6/13/2016	N	Pyrene	Y	240	9090	697	0.1471	1631.80	2.3412
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Acenaphthene	Y	8.4	33400	491	0.1471	57.11	0.1163
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Anthracene	Y	21	1300	594	0.1471	142.78	0.2404
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Benzo(A)Anthracene	Y	89	4153	841	0.1471	605.13	0.7195
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Benzo(A)Pyrene	Y	76	3840	965	0.1471	516.74	0.5355
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Benzo(B)Fluoranthene	Y	190	2169	979	0.1471	1291.84	1.3196
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Benzo(K)Fluoranthene	Y	57	1220	981	0.1471	387.55	0.3951
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Chrysene	Y	220	826	844	0.1471	1495.82	0.9787
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Fluoranthene	Y	250	23870	707	0.1471	1699.79	2.4042
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Fluorene	Y	8.1	26000	538	0.1471	55.07	0.1024
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Naphthalene	Y	2.1	61700	385	0.1471	14.28	0.0371
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Phenanthrene	Y	86	34300	596	0.1471	584.73	0.9811
CFSB-026-SO-0-0	CFSB-026	0.00-0.50	6/13/2016	N	Pyrene	Y	300	9090	697	0.1471	2039.75	2.9265
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Acenaphthene	Y	0.91	33400	491	0.1471	6.19	0.0126
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Anthracene	Y	2	1300	594	0.1471	13.60	0.0229
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Benzo(A)Anthracene	Y	13	4153	841	0.1471	88.39	0.1051
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Benzo(A)Pyrene	Y	15	3840	965	0.1471	101.99	0.1057
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Benzo(B)Fluoranthene	Y	18	2169	979	0.1471	122.38	0.1250
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Benzo(K)Fluoranthene	Y	6.1	1220	981	0.1471	41.47	0.0423
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Chrysene	Y	15	826	844	0.1471	101.99	0.1208
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Fluoranthene	Y	22	23870	707	0.1471	149.58	0.2116
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Fluorene	Y	0.82	26000	538	0.1471	5.58	0.0104
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Naphthalene	Y	0.2	61700	385	0.1471	1.36	0.0035
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Phenanthrene	Y	12	34300	596	0.1471	81.59	0.1369
CFSB-027-SO-0-0	CFSB-027	0.00-0.50	6/13/2016	N	Pyrene	Y	22	9090	697	0.1471	149.58	0.2146
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Acenaphthene	Y	0.31	33400	491	0.1471	2.11	0.0043
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Anthracene	Y	0.89	1300	594	0.1471	6.05	0.0102
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Benzo(A)Anthracene	Y	4.9	4153	841	0.1471	33.32	0.0396
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Benzo(A)Pyrene	Y	5.3	3840	965	0.1471	36.04	0.0373
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Benzo(B)Fluoranthene	Y	8.8	2169	979	0.1471	59.83	0.0611
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Benzo(K)Fluoranthene	Y	3.3	1220	981	0.1471	22.44	0.0229
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Chrysene	Y	8.8	826	844	0.1471	59.83	0.0709
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Fluoranthene	Y	7.5	23870	707	0.1471	50.99	0.0721
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Fluorene	Y	0.21	26000	538	0.1471	1.43	0.0027
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Naphthalene	Y	0.077	61700	385	0.1471	0.52	0.0014
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Phenanthrene	Y	3.7	34300	596	0.1471	25.16	0.0422
CFSB-028-SO-0-0	CFSB-028	0.00-0.50	7/18/2016	N	Pyrene	Y	7.7	9090	697	0.1471	52.35	0.0751
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Acenaphthene	Y	0.36	33400	491	0.1471	2.45	0.0050
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Anthracene	Y	0.85	1300	594	0.1471	5.78	0.0097
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Benzo(A)Anthracene	Y	6	4153	841	0.1471	40.79	0.0485
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Benzo(A)Pyrene	Y	6.9	3840	965	0.1471	46.91	0.0486
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Benzo(B)Fluoranthene	Y	13	2169	979	0.1471	88.39	0.0903

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Benzo(K)Fluoranthene	Y	4.3	1220	981	0.1471	29.24	0.0298
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Chrysene	Y	11	826	844	0.1471	74.79	0.0886
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Fluoranthene	Y	11	23870	707	0.1471	74.79	0.1058
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Fluorene	Y	0.3	26000	538	0.1471	2.04	0.0038
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Naphthalene	Y	0.14	61700	385	0.1471	0.95	0.0025
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Phenanthrene	Y	4.4	34300	596	0.1471	29.92	0.0502
CFSB-030-SO-0-0	CFSB-030	0.00-0.50	6/13/2016	N	Pyrene	Y	9.6	9090	697	0.1471	65.27	0.0936
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Acenaphthene	Y	2.9	33400	491	0.1240	23.39	0.0476
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Acenaphthylene	N	---	24000	452	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Anthracene	Y	13	1300	594	0.1240	104.84	0.1765
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Benzo(A)Anthracene	Y	79	4153	841	0.1240	637.10	0.7575
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Benzo(A)Pyrene	Y	68	3840	965	0.1240	548.39	0.5683
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Benzo(B)Fluoranthene	Y	110	2169	979	0.1240	887.10	0.9061
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Benzo(G,H,I)Perylene	Y	63	648	1095	0.1240	508.06	0.4640
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Benzo(K)Fluoranthene	Y	79	1220	981	0.1240	637.10	0.6494
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Benzo[E]Pyrene	Y	76	4300	967	0.1240	612.90	0.6338
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C1-Chrysenes	Y	34	---	929	0.1240	274.19	0.2951
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C1-Fluoranthenes/Pyrenes	Y	63	---	770	0.1240	508.06	0.6598
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C1-Fluorenes	N	---	---	611	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C1-Naphthalenes	N	---	---	444	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C1-Phenanthrenes/Anthracen	Y	16	---	670	0.1240	129.03	0.1926
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C2-Chrysenes	Y	8.9	---	1008	0.1240	71.77	0.0712
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C2-Fluorenes	N	---	---	686	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C2-Naphthalenes	N	---	---	510	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C2-Phenanthrenes/Anthracen	Y	10	---	746	0.1240	80.65	0.1081
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C3-Chrysenes	Y	4.9	---	1112	0.1240	39.52	0.0355
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C3-Fluorenes	N	---	---	769	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C3-Naphthalenes	N	---	---	581	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C3-Phenanthrenes/Anthracen	Y	5.2	---	829	0.1240	41.94	0.0506
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C4 Chrysenes	N	---	---	1214	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C4-Naphthalenes	N	---	---	657	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Chrysene	Y	110	826	844	0.1240	887.10	0.9787
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Dibenz(A,H)Anthracene	Y	20	2389	1123	0.1240	161.29	0.1436
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Fluoranthene	Y	220	23870	707	0.1240	1774.19	2.5095
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Fluorene	Y	2.1	26000	538	0.1240	16.94	0.0315
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	57	---	1115	0.1240	459.68	0.4123
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Naphthalene	N	---	61700	385	0.1240	---	---
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Perylene	Y	19	431	967	0.1240	153.23	0.1585
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Phenanthrene	Y	31	34300	596	0.1240	250.00	0.4195
CFSB-199-SO-0-0	CFSB-199	0.00-0.50	6/28/2018	N	Pyrene	Y	190	9090	697	0.1240	1532.26	2.1984
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Acenaphthene	Y	0.06	33400	491	0.0235	2.55	0.0052
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Acenaphthylene	N	---	24000	452	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Anthracene	Y	0.31	1300	594	0.0235	13.19	0.0222
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Benzo(A)Anthracene	Y	2.2	4153	841	0.0235	93.62	0.1113
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Benzo(A)Pyrene	Y	3.3	3840	965	0.0235	140.43	0.1455
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Benzo(B)Fluoranthene	Y	5	2169	979	0.0235	212.77	0.2173
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Benzo(G,H,I)Perylene	Y	4.8	648	1095	0.0235	204.26	0.1865
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Benzo(K)Fluoranthene	Y	4.1	1220	981	0.0235	174.47	0.1778

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Benzo[E]Pyrene	Y	3.9	4300	967	0.0235	165.96	0.1716
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C1-Chrysenes	Y	1	---	929	0.0235	42.55	0.0458
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C1-Fluoranthenes/Pyrenes	Y	1.6	---	770	0.0235	68.09	0.0884
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C1-Fluorenes	N	---	---	611	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C1-Naphthalenes	N	---	---	444	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C1-Phenanthrenes/Anthracen	Y	0.37	---	670	0.0235	15.74	0.0235
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C2-Chrysenes	Y	0.43	---	1008	0.0235	18.30	0.0182
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C2-Fluorenes	N	---	---	686	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C2-Naphthalenes	N	---	---	510	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C2-Phenanthrenes/Anthracen	Y	0.23	---	746	0.0235	9.79	0.0131
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C3-Chrysenes	N	---	---	1112	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C3-Fluorenes	N	---	---	769	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C3-Naphthalenes	N	---	---	581	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C3-Phenanthrenes/Anthracen	Y	0.15	---	829	0.0235	6.38	0.0077
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C4 Chrysenes	N	---	---	1214	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C4-Naphthalenes	N	---	---	657	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Chrysene	Y	3.2	826	844	0.0235	136.17	0.1613
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Dibenz(A,H)Anthracene	Y	1.2	2389	1123	0.0235	51.06	0.0455
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Fluoranthene	Y	3.1	23870	707	0.0235	131.91	0.1866
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Fluorene	N	---	26000	538	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	4.2	---	1115	0.0235	178.72	0.1603
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Naphthalene	N	---	61700	385	0.0235	---	---
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Perylene	Y	0.87	431	967	0.0235	37.02	0.0383
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Phenanthrene	Y	0.75	34300	596	0.0235	31.91	0.0535
CFSB-201-SO-0-0	CFSB-201	0.00-0.50	6/22/2018	N	Pyrene	Y	3.7	9090	697	0.0235	157.45	0.2259
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Acenaphthene	Y	0.18	33400	491	0.0294	6.12	0.0125
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Acenaphthylene	N	---	24000	452	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Anthracene	Y	2.1	1300	594	0.0294	71.43	0.1203
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Benzo(A)Anthracene	Y	9.1	4153	841	0.0294	309.52	0.3680
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Benzo(A)Pyrene	Y	9.9	3840	965	0.0294	336.73	0.3489
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Benzo(B)Fluoranthene	Y	24	2169	979	0.0294	816.33	0.8338
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Benzo(G,H,I)Perylene	Y	12	648	1095	0.0294	408.16	0.3728
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Benzo(K)Fluoranthene	Y	17	1220	981	0.0294	578.23	0.5894
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Benzo[E]Pyrene	Y	15	4300	967	0.0294	510.20	0.5276
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C1-Chrysenes	Y	5.1	---	929	0.0294	173.47	0.1867
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C1-Fluoranthenes/Pyrenes	Y	6.8	---	770	0.0294	231.29	0.3004
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C1-Fluorenes	N	---	---	611	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C1-Naphthalenes	N	---	---	444	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C1-Phenanthrenes/Anthracen	Y	2.2	---	670	0.0294	74.83	0.1117
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C2-Chrysenes	Y	2.1	---	1008	0.0294	71.43	0.0709
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C2-Fluorenes	N	---	---	686	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C2-Naphthalenes	N	---	---	510	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C2-Phenanthrenes/Anthracen	Y	1.6	---	746	0.0294	54.42	0.0730
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C3-Chrysenes	N	---	---	1112	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C3-Fluorenes	N	---	---	769	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C3-Naphthalenes	N	---	---	581	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C3-Phenanthrenes/Anthracen	Y	0.82	---	829	0.0294	27.89	0.0336
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C4 Chrysenes	N	---	---	1214	0.0294	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C4-Naphthalenes	N	---	---	657	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	C4-Phenanthrenes/Anthracene	N	---	---	913	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Chrysene	Y	11	826	844	0.0294	374.15	0.4433
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Dibenz(A,H)Anthracene	Y	4.2	2389	1123	0.0294	142.86	0.1272
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Fluoranthene	Y	11	23870	707	0.0294	374.15	0.5292
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Fluorene	N	---	26000	538	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	12	---	1115	0.0294	408.16	0.3661
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Naphthalene	N	---	61700	385	0.0294	---	---
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Perylene	Y	2.5	431	967	0.0294	85.03	0.0879
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Phenanthrene	Y	2.7	34300	596	0.0294	91.84	0.1541
CFSB-202-SO-0-0	CFSB-202	0.00-0.50	6/22/2018	N	Pyrene	Y	13	9090	697	0.0294	442.18	0.6344
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Acenaphthene	Y	190	33400	491	0.1820	1043.96	2.1262
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Acenaphthylene	N	---	24000	452	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Anthracene	Y	250	1300	594	0.1820	1373.63	2.1886
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Benzo(A)Anthracene	Y	2700	4153	841	0.1820	14835.16	4.9382
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Benzo(A)Pyrene	Y	3100	3840	965	0.1820	17032.97	3.9793
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Benzo(B)Fluoranthene	Y	3000	2169	979	0.1820	16483.52	2.2155
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Benzo(G,H,I)Perylene	Y	2200	648	1095	0.1820	12087.91	0.5918
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Benzo(K)Fluoranthene	Y	2400	1220	981	0.1820	13186.81	1.2436
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Benzo[E]Pyrene	Y	2100	4300	967	0.1820	11538.46	4.4467
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C1-Chrysenes	Y	880	---	929	0.1820	4835.16	5.2047
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C1-Fluoranthenes/Pyrenes	Y	1400	---	770	0.1820	7692.31	9.9900
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C1-Fluorenes	N	---	---	611	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C1-Naphthalenes	N	---	---	444	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C1-Phenanthrenes/Anthracene	Y	360	---	670	0.1820	1978.02	2.9523
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C2-Chrysenes	Y	230	---	1008	0.1820	1263.74	1.2537
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C2-Fluorenes	N	---	---	686	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C2-Naphthalenes	N	---	---	510	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C2-Phenanthrenes/Anthracene	Y	160	---	746	0.1820	879.12	1.1784
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C3-Chrysenes	N	---	---	1112	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C3-Fluorenes	N	---	---	769	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C3-Naphthalenes	N	---	---	581	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C3-Phenanthrenes/Anthracene	N	---	---	829	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C4 Chrysenes	N	---	---	1214	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C4-Naphthalenes	N	---	---	657	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	C4-Phenanthrenes/Anthracene	N	---	---	913	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Chrysene	Y	2800	826	844	0.1820	15384.62	0.9787
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Dibenz(A,H)Anthracene	Y	740	2389	1123	0.1820	4065.93	2.1273
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Fluoranthene	Y	3700	23870	707	0.1820	20329.67	28.7548
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Fluorene	Y	82	26000	538	0.1820	450.55	0.8375
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	2000	---	1115	0.1820	10989.01	9.8556
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Naphthalene	N	---	61700	385	0.1820	---	---
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Perylene	Y	850	431	967	0.1820	4670.33	0.4457
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Phenanthrene	Y	1300	34300	596	0.1820	7142.86	11.9847
CFSB-203-SO-0-0	CFSB-203	0.00-0.50	6/28/2018	N	Pyrene	Y	3200	9090	697	0.1820	17582.42	13.0416
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Acenaphthene	Y	1.5	33400	491	0.0571	26.27	0.0535
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Acenaphthylene	Y	0.23	24000	452	0.0571	4.03	0.0089
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Anthracene	Y	5	1300	594	0.0571	87.57	0.1474
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Benzo(A)Anthracene	Y	24	4153	841	0.0571	420.32	0.4998

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Benzo(A)Pyrene	Y	36	3840	965	0.0571	630.47	0.6533
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Benzo(B)Fluoranthene	Y	64	2169	979	0.0571	1120.84	1.1449
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Benzo(K)Fluoranthene	Y	24	1220	981	0.0571	420.32	0.4285
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Chrysene	Y	33	826	844	0.0571	577.93	0.6848
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Fluoranthene	Y	42	23870	707	0.0571	735.55	1.0404
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Fluorene	Y	0.71	26000	538	0.0571	12.43	0.0231
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Naphthalene	Y	0.56	61700	385	0.0571	9.81	0.0255
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Phenanthrene	Y	16	34300	596	0.0571	280.21	0.4702
CFSB-204-SO-0-0	CFSB-204	0.00-0.50	6/22/2018	N	Pyrene	Y	39	9090	697	0.0571	683.01	0.9799
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Acenaphthene	Y	0.39	33400	491	0.1290	3.02	0.0062
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Acenaphthylene	N	---	24000	452	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Anthracene	Y	0.9	1300	594	0.1290	6.98	0.0117
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Benzo(A)Anthracene	Y	4.1	4153	841	0.1290	31.78	0.0378
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Benzo(A)Pyrene	Y	4.7	3840	965	0.1290	36.43	0.0378
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Benzo(B)Fluoranthene	Y	5	2169	979	0.1290	38.76	0.0396
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Benzo(G,H,I)Perylene	Y	3.7	648	1095	0.1290	28.68	0.0262
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Benzo(K)Fluoranthene	Y	4.1	1220	981	0.1290	31.78	0.0324
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Benzo[E]Pyrene	Y	3.5	4300	967	0.1290	27.13	0.0281
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C1-Chrysenes	Y	1.6	---	929	0.1290	12.40	0.0134
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C1-Fluoranthenes/Pyrenes	Y	3	---	770	0.1290	23.26	0.0302
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C1-Fluorenes	N	---	---	611	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C1-Naphthalenes	N	---	---	444	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C1-Phenanthrenes/Anthracen	Y	1	---	670	0.1290	7.75	0.0116
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C2-Chrysenes	Y	0.58	---	1008	0.1290	4.50	0.0045
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C2-Fluorenes	N	---	---	686	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C2-Naphthalenes	N	---	---	510	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C2-Phenanthrenes/Anthracen	Y	0.45	---	746	0.1290	3.49	0.0047
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C3-Chrysenes	Y	0.27	---	1112	0.1290	2.09	0.0019
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C3-Fluorenes	N	---	---	769	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C3-Naphthalenes	N	---	---	581	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C3-Phenanthrenes/Anthracen	Y	0.25	---	829	0.1290	1.94	0.0023
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C4 Chrysenes	N	---	---	1214	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C4-Naphthalenes	N	---	---	657	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.1290	---	---
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Chrysene	Y	5	826	844	0.1290	38.76	0.0459
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Dibenz(A,H)Anthracene	Y	1.3	2389	1123	0.1290	10.08	0.0090
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Fluoranthene	Y	6.9	23870	707	0.1290	53.49	0.0757
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Fluorene	Y	0.27	26000	538	0.1290	2.09	0.0039
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	3.5	---	1115	0.1290	27.13	0.0243
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Naphthalene	Y	0.11	61700	385	0.1290	0.85	0.0022
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Perylene	Y	1.2	431	967	0.1290	9.30	0.0096
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Phenanthrene	Y	3.7	34300	596	0.1290	28.68	0.0481
CFSB-214-SO-0-0	CFSB-214	0.00-0.50	6/22/2018	N	Pyrene	Y	7.2	9090	697	0.1290	55.81	0.0801
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Acenaphthene	Y	130	33400	491	0.1471	883.89	1.8002
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Acenaphthylene	Y	0.89	24000	452	0.1471	6.05	0.0134
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Anthracene	Y	180	1300	594	0.1471	1223.85	2.0604
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Benzo(A)Anthracene	Y	1700	4153	841	0.1471	11558.58	4.9382
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Benzo(A)Pyrene	Y	1900	3840	965	0.1471	12918.41	3.9793
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Benzo(B)Fluoranthene	Y	2100	2169	979	0.1471	14278.24	2.2155

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Benzo(G,H,I)Perylene	Y	1400	648	1095	0.1471	9518.83	0.5918
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Benzo(K)Fluoranthene	Y	1300	1220	981	0.1471	8838.91	1.2436
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Benzo(E)Pyrene	Y	1300	4300	967	0.1471	8838.91	4.4467
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C1-Chrysenes	Y	490	---	929	0.1471	3331.59	3.5862
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C1-Fluoranthenes/Pyrenes	Y	770	---	770	0.1471	5235.36	6.7992
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C1-Fluorenes	Y	13	---	611	0.1471	88.39	0.1447
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C1-Naphthalenes	Y	8.3	---	444	0.1471	56.43	0.1271
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C1-Phenanthrenes/Anthracen	Y	220	---	670	0.1471	1495.82	2.2326
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C2-Chrysenes	Y	150	---	1008	0.1471	1019.87	1.0118
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C2-Fluorenes	Y	9.5	---	686	0.1471	64.59	0.0942
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C2-Naphthalenes	Y	13	---	510	0.1471	88.39	0.1733
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C2-Phenanthrenes/Anthracen	Y	98	---	746	0.1471	666.32	0.8932
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C3-Chrysenes	Y	46	---	1112	0.1471	312.76	0.2813
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C3-Fluorenes	Y	20	---	769	0.1471	135.98	0.1768
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C3-Naphthalenes	Y	8.6	---	581	0.1471	58.47	0.1006
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C3-Phenanthrenes/Anthracen	Y	47	---	829	0.1471	319.56	0.3855
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C4 Chrysenes	Y	16	---	1214	0.1471	108.79	0.0896
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C4-Naphthalenes	Y	3.8	---	657	0.1471	25.84	0.0393
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	C4-Phenanthrenes/Anthracen	Y	12	---	913	0.1471	81.59	0.0894
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Chrysene	Y	1700	826	844	0.1471	11558.58	0.9787
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Dibenz(A,H)Anthracene	Y	490	2389	1123	0.1471	3331.59	2.1273
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Fluoranthene	Y	2200	23870	707	0.1471	14958.16	21.1572
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Fluorene	Y	50	26000	538	0.1471	339.96	0.6319
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	1300	---	1115	0.1471	8838.91	7.9273
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Naphthalene	Y	12	61700	385	0.1471	81.59	0.2119
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Perylene	Y	510	431	967	0.1471	3467.57	0.4457
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Phenanthrene	Y	760	34300	596	0.1471	5167.36	8.6701
CFSB-272-SO-0-0	CFSB-272	0.00-0.50	6/28/2018	N	Pyrene	Y	2000	9090	697	0.1471	13598.33	13.0416
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Acenaphthene	Y	19	33400	491	0.0835	227.54	0.4634
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Acenaphthylene	Y	0.85	24000	452	0.0835	10.18	0.0225
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Anthracene	Y	54	1300	594	0.0835	646.71	1.0887
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Benzo(A)Anthracene	Y	130	4153	841	0.0835	1556.89	1.8512
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Benzo(A)Pyrene	Y	100	3840	965	0.0835	1197.60	1.2410
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Benzo(B)Fluoranthene	Y	190	2169	979	0.0835	2275.45	2.2155
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Benzo(K)Fluoranthene	Y	62	1220	981	0.0835	742.51	0.7569
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Chrysene	Y	190	826	844	0.0835	2275.45	0.9787
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Fluoranthene	Y	480	23870	707	0.0835	5748.50	8.1308
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Fluorene	Y	10	26000	538	0.0835	119.76	0.2226
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Naphthalene	Y	1.5	61700	385	0.0835	17.96	0.0467
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Phenanthrene	Y	110	34300	596	0.0835	1317.37	2.2103
CFSB-273-SO-0-0	CFSB-273	0.00-0.50	5/4/2018	N	Pyrene	Y	420	9090	697	0.0835	5029.94	7.2166
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Acenaphthene	Y	0.12	33400	491	0.1471	0.82	0.0017
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Anthracene	Y	0.94	1300	594	0.1471	6.39	0.0108
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Benzo(A)Anthracene	Y	5.7	4153	841	0.1471	38.76	0.0461
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Benzo(A)Pyrene	Y	5.8	3840	965	0.1471	39.44	0.0409
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Benzo(B)Fluoranthene	Y	16	2169	979	0.1471	108.79	0.1111
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Benzo(G,H,I)Perylene	Y	4.5	648	1095	0.1471	30.60	0.0279
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Benzo(K)Fluoranthene	Y	9.6	1220	981	0.1471	65.27	0.0665

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Benzo[E]Pyrene	Y	8.2	4300	967	0.1471	55.75	0.0577
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C1-Chrysenes	Y	2.8	---	929	0.1471	19.04	0.0205
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C1-Fluoranthenes/Pyrenes	Y	4.9	---	770	0.1471	33.32	0.0433
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C1-Fluorenes	N	---	---	611	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C1-Naphthalenes	N	---	---	444	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C1-Phenanthrenes/Anthracen	Y	0.77	---	670	0.1471	5.24	0.0078
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C2-Chrysenes	Y	1.3	---	1008	0.1471	8.84	0.0088
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C2-Fluorenes	N	---	---	686	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C2-Naphthalenes	N	---	---	510	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C2-Phenanthrenes/Anthracen	Y	0.52	---	746	0.1471	3.54	0.0047
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C3-Chrysenes	Y	0.34	---	1112	0.1471	2.31	0.0021
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C3-Fluorenes	N	---	---	769	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C3-Naphthalenes	N	---	---	581	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C3-Phenanthrenes/Anthracen	Y	0.31	---	829	0.1471	2.11	0.0025
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C4 Chrysenes	N	---	---	1214	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C4-Naphthalenes	N	---	---	657	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Chrysene	Y	7.8	826	844	0.1471	53.03	0.0628
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Dibenz(A,H)Anthracene	Y	1.9	2389	1123	0.1471	12.92	0.0115
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Fluoranthene	Y	6.7	23870	707	0.1471	45.55	0.0644
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Fluorene	Y	0.099	26000	538	0.1471	0.67	0.0013
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	5	---	1115	0.1471	34.00	0.0305
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Naphthalene	N	---	61700	385	0.1471	---	---
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Perylene	Y	1.5	431	967	0.1471	10.20	0.0105
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Phenanthrene	Y	1.6	34300	596	0.1471	10.88	0.0183
CFSB-279-SO-0-0	CFSB-279	0.00-0.50	6/22/2018	N	Pyrene	Y	6.9	9090	697	0.1471	46.91	0.0673
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Acenaphthene	Y	0.15	33400	491	0.1471	1.02	0.0021
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Acenaphthylene	N	---	24000	452	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Anthracene	Y	0.7	1300	594	0.1471	4.76	0.0080
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Benzo(A)Anthracene	Y	3.8	4153	841	0.1471	25.84	0.0307
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Benzo(A)Pyrene	Y	5.2	3840	965	0.1471	35.36	0.0366
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Benzo(B)Fluoranthene	Y	8.6	2169	979	0.1471	58.47	0.0597
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Benzo(G,H,I)Perylene	Y	8.4	648	1095	0.1471	57.11	0.0522
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Benzo(K)Fluoranthene	Y	6.8	1220	981	0.1471	46.23	0.0471
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Benzo[E]Pyrene	Y	6.3	4300	967	0.1471	42.83	0.0443
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C1-Chrysenes	Y	1.6	---	929	0.1471	10.88	0.0117
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C1-Fluoranthenes/Pyrenes	Y	2.8	---	770	0.1471	19.04	0.0247
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C1-Fluorenes	N	---	---	611	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C1-Naphthalenes	N	---	---	444	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C1-Phenanthrenes/Anthracen	Y	0.72	---	670	0.1471	4.90	0.0073
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C2-Chrysenes	Y	0.71	---	1008	0.1471	4.83	0.0048
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C2-Fluorenes	N	---	---	686	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C2-Naphthalenes	N	---	---	510	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C2-Phenanthrenes/Anthracen	Y	0.47	---	746	0.1471	3.20	0.0043
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C3-Chrysenes	N	---	---	1112	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C3-Fluorenes	N	---	---	769	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C3-Naphthalenes	N	---	---	581	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C3-Phenanthrenes/Anthracen	N	---	---	829	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C4 Chrysenes	N	---	---	1214	0.1471	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C4-Naphthalenes	N	---	---	657	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	C4-Phenanthrenes/Anthracene	N	---	---	913	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Chrysene	Y	5.2	826	844	0.1471	35.36	0.0419
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Dibenz(A,H)Anthracene	Y	1.9	2389	1123	0.1471	12.92	0.0115
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Fluoranthene	Y	5.2	23870	707	0.1471	35.36	0.0500
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Fluorene	N	---	26000	538	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	7.1	---	1115	0.1471	48.27	0.0433
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Naphthalene	N	---	61700	385	0.1471	---	---
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Perylene	Y	1.5	431	967	0.1471	10.20	0.0105
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Phenanthrene	Y	1.6	34300	596	0.1471	10.88	0.0183
CFSB-280-SO-0-0	CFSB-280	0.00-0.50	6/22/2018	N	Pyrene	Y	6	9090	697	0.1471	40.79	0.0585
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Acenaphthene	Y	3	33400	491	0.1110	27.03	0.0550
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Acenaphthylene	N	---	24000	452	0.1110	---	---
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Anthracene	Y	17	1300	594	0.1110	153.15	0.2578
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Benzo(A)Anthracene	Y	80	4153	841	0.1110	720.72	0.8570
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Benzo(A)Pyrene	Y	55	3840	965	0.1110	495.50	0.5135
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Benzo(B)Fluoranthene	Y	100	2169	979	0.1110	900.90	0.9202
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Benzo(K)Fluoranthene	Y	29	1220	981	0.1110	261.26	0.2663
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Chrysene	Y	110	826	844	0.1110	990.99	0.9787
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Fluoranthene	Y	270	23870	707	0.1110	2432.43	3.4405
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Fluorene	Y	2.5	26000	538	0.1110	22.52	0.0419
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Naphthalene	Y	0.7	61700	385	0.1110	6.31	0.0164
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Phenanthrene	Y	37	34300	596	0.1110	333.33	0.5593
CFSB-281-SO-0-0	CFSB-281	0.00-0.50	5/4/2018	N	Pyrene	Y	230	9090	697	0.1110	2072.07	2.9728
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Acenaphthene	Y	0.28	33400	491	0.4940	0.57	0.0012
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Acenaphthylene	Y	0.086	24000	452	0.4940	0.17	0.0004
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Anthracene	Y	1.7	1300	594	0.4940	3.44	0.0058
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Benzo(A)Anthracene	Y	14	4153	841	0.4940	28.34	0.0337
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Benzo(A)Pyrene	Y	19	3840	965	0.4940	38.46	0.0399
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Benzo(B)Fluoranthene	Y	40	2169	979	0.4940	80.97	0.0827
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Benzo(K)Fluoranthene	Y	17	1220	981	0.4940	34.41	0.0351
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Chrysene	Y	18	826	844	0.4940	36.44	0.0432
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Fluoranthene	Y	21	23870	707	0.4940	42.51	0.0601
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Fluorene	Y	0.11	26000	538	0.4940	0.22	0.0004
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Naphthalene	Y	0.39	61700	385	0.4940	0.79	0.0021
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Phenanthrene	Y	6.2	34300	596	0.4940	12.55	0.0211
CFSDP-023-SD	CFSDP-023	0.00-0.50	9/7/2016	N	Pyrene	Y	16	9090	697	0.4940	32.39	0.0465
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Acenaphthene	Y	4.1	33400	491	0.4700	8.72	0.0178
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Acenaphthylene	N	---	24000	452	0.4700	---	---
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Anthracene	Y	9.9	1300	594	0.4700	21.06	0.0355
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Benzo(A)Anthracene	Y	76	4153	841	0.4700	161.70	0.1923
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Benzo(A)Pyrene	Y	100	3840	965	0.4700	212.77	0.2205
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Benzo(B)Fluoranthene	Y	210	2169	979	0.4700	446.81	0.4564
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Benzo(K)Fluoranthene	Y	64	1220	981	0.4700	136.17	0.1388
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Chrysene	Y	150	826	844	0.4700	319.15	0.3781
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Fluoranthene	Y	120	23870	707	0.4700	255.32	0.3611
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Fluorene	Y	2.1	26000	538	0.4700	4.47	0.0083
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Naphthalene	Y	0.89	61700	385	0.4700	1.89	0.0049
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Phenanthrene	Y	41	34300	596	0.4700	87.23	0.1464

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-024-SD	CFSDP-024	0.00-0.50	9/7/2016	N	Pyrene	Y	120	9090	697	0.4700	255.32	0.3663
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Acenaphthene	Y	0.32	33400	491	0.5550	0.58	0.0012
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Acenaphthylene	N	---	24000	452	0.5550	---	---
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Anthracene	Y	1.3	1300	594	0.5550	2.34	0.0039
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Benzo(A)Anthracene	Y	15	4153	841	0.5550	27.03	0.0321
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Benzo(A)Pyrene	Y	21	3840	965	0.5550	37.84	0.0392
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Benzo(B)Fluoranthene	Y	55	2169	979	0.5550	99.10	0.1012
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Benzo(K)Fluoranthene	Y	18	1220	981	0.5550	32.43	0.0331
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Chrysene	Y	19	826	844	0.5550	34.23	0.0406
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Fluoranthene	Y	17	23870	707	0.5550	30.63	0.0433
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Fluorene	Y	0.12	26000	538	0.5550	0.22	0.0004
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Naphthalene	Y	0.45	61700	385	0.5550	0.81	0.0021
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Phenanthrene	Y	6.9	34300	596	0.5550	12.43	0.0209
CFSDP-DUP2-SD	CFSDP-023	0.00-0.50	9/7/2016	FD	Pyrene	Y	26	9090	697	0.5550	46.85	0.0672
Flathead River Riparian Area												
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Acenaphthene	N	---	33400	491	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Acenaphthylene	N	---	24000	452	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Anthracene	N	---	1300	594	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Benzo(A)Pyrene	Y	0.071	3840	965	0.0023	31.00	0.0321
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Benzo(B)Fluoranthene	Y	0.34	2169	979	0.0023	148.47	0.1517
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Chrysene	Y	0.5	826	844	0.0023	218.34	0.2587
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Fluoranthene	Y	0.94	23870	707	0.0023	410.48	0.5806
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Fluorene	N	---	26000	538	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Naphthalene	N	---	61700	385	0.0023	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Phenanthrene	Y	0.14	34300	596	0.0023	61.14	0.1026
CFSDP-029-SD	CFSDP-029	0.00-0.50	11/1/2017	N	Pyrene	Y	0.52	9090	697	0.0023	227.07	0.3258
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Acenaphthene	Y	4.00E-04	33400	491	0.0051	0.08	0.0002
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Acenaphthylene	N	---	24000	452	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Anthracene	Y	0.0017	1300	594	0.0051	0.34	0.0006
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Benzo(A)Anthracene	Y	0.018	4153	841	0.0051	3.55	0.0042
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Benzo(A)Pyrene	Y	0.0089	3840	965	0.0051	1.76	0.0018
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Benzo(B)Fluoranthene	Y	0.035	2169	979	0.0051	6.90	0.0071
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Benzo(G,H,I)Perylene	Y	0.011	648	1095	0.0051	2.17	0.0020
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Benzo(K)Fluoranthene	Y	0.024	1220	981	0.0051	4.73	0.0048
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Benzo[E]Pyrene	Y	0.02	4300	967	0.0051	3.94	0.0041
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C1-Chrysenes	Y	0.0092	---	929	0.0051	1.81	0.0020
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C1-Fluoranthenes/Pyrenes	Y	0.017	---	770	0.0051	3.35	0.0044
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C1-Fluorenes	N	---	---	611	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C1-Naphthalenes	N	---	---	444	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C1-Phenanthrenes/Anthracen	Y	0.0053	---	670	0.0051	1.05	0.0016
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C2-Chrysenes	Y	0.0024	---	1008	0.0051	0.47	0.0005
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C2-Fluorenes	N	---	---	686	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C2-Naphthalenes	N	---	---	510	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C2-Phenanthrenes/Anthracen	Y	0.004	---	746	0.0051	0.79	0.0011
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C3-Chrysenes	N	---	---	1112	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C3-Fluorenes	N	---	---	769	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C3-Naphthalenes	Y	0.0033	---	581	0.0051	0.65	0.0011

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C3-Phenanthrenes/Anthracene	Y	0.0021	---	829	0.0051	0.41	0.0005
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C4 Chrysenes	N	---	---	1214	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C4-Naphthalenes	N	---	---	657	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	C4-Phenanthrenes/Anthracene	N	---	---	913	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Chrysene	Y	0.057	826	844	0.0051	11.24	0.0133
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Dibenz(A,H)Anthracene	Y	0.0033	2389	1123	0.0051	0.65	0.0006
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Fluoranthene	Y	0.053	23870	707	0.0051	10.45	0.0148
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Fluorene	N	---	26000	538	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	0.011	---	1115	0.0051	2.17	0.0019
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Naphthalene	N	---	61700	385	0.0051	---	---
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Perylene	Y	0.004	431	967	0.0051	0.79	0.0008
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Phenanthrene	Y	0.0083	34300	596	0.0051	1.64	0.0027
CFSDP-029-SD	CFSDP-029	0.00-0.50	10/18/2018	N	Pyrene	Y	0.049	9090	697	0.0051	9.66	0.0139
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Acenaphthene	N	---	33400	491	0.0143	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Acenaphthylene	N	---	24000	452	0.0143	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Anthracene	N	---	1300	594	0.0143	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Benzo(A)Anthracene	Y	0.066	4153	841	0.0143	4.62	0.0055
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Benzo(A)Pyrene	Y	0.091	3840	965	0.0143	6.36	0.0066
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Benzo(B)Fluoranthene	Y	0.16	2169	979	0.0143	11.19	0.0114
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Benzo(K)Fluoranthene	Y	0.054	1220	981	0.0143	3.78	0.0038
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Chrysene	Y	0.11	826	844	0.0143	7.69	0.0091
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Fluoranthene	Y	0.082	23870	707	0.0143	5.73	0.0081
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Fluorene	N	---	26000	538	0.0143	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Naphthalene	N	---	61700	385	0.0143	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Phenanthrene	Y	0.044	34300	596	0.0143	3.08	0.0052
CFSDP-030-SD	CFSDP-030	0.00-0.50	11/3/2017	N	Pyrene	Y	0.098	9090	697	0.0143	6.85	0.0098
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Acenaphthene	N	---	33400	491	0.0096	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Acenaphthylene	N	---	24000	452	0.0096	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Anthracene	N	---	1300	594	0.0096	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Benzo(A)Anthracene	Y	0.021	4153	841	0.0096	2.19	0.0026
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Benzo(A)Pyrene	Y	0.024	3840	965	0.0096	2.50	0.0026
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Benzo(B)Fluoranthene	Y	0.046	2169	979	0.0096	4.79	0.0049
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Benzo(K)Fluoranthene	Y	0.016	1220	981	0.0096	1.66	0.0017
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Chrysene	Y	0.052	826	844	0.0096	5.41	0.0064
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Fluoranthene	Y	0.057	23870	707	0.0096	5.93	0.0084
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Fluorene	N	---	26000	538	0.0096	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Naphthalene	N	---	61700	385	0.0096	---	---
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Phenanthrene	Y	0.018	34300	596	0.0096	1.87	0.0031
CFSDP-030-SD	CFSDP-030	0.00-0.50	10/18/2018	N	Pyrene	Y	0.043	9090	697	0.0096	4.47	0.0064
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Acenaphthene	N	---	33400	491	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Acenaphthylene	N	---	24000	452	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Anthracene	N	---	1300	594	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Benzo(A)Pyrene	N	---	3840	965	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Benzo(B)Fluoranthene	Y	0.053	2169	979	0.0148	3.58	0.0037
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Chrysene	Y	0.028	826	844	0.0148	1.89	0.0022
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Fluoranthene	Y	0.028	23870	707	0.0148	1.89	0.0027
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Fluorene	N	---	26000	538	0.0148	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Naphthalene	N	---	61700	385	0.0148	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Phenanthrene	Y	0.014	34300	596	0.0148	0.95	0.0016
CFSDP-031-SD	CFSDP-031	0.00-0.50	11/3/2017	N	Pyrene	Y	0.031	9090	697	0.0148	2.09	0.0030
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Acenaphthene	N	---	33400	491	0.0371	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Acenaphthylene	N	---	24000	452	0.0371	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Anthracene	Y	0.0096	1300	594	0.0371	0.26	0.0004
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Benzo(A)Anthracene	Y	0.074	4153	841	0.0371	1.99	0.0024
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Benzo(A)Pyrene	Y	0.036	3840	965	0.0371	0.97	0.0010
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Benzo(B)Fluoranthene	Y	0.16	2169	979	0.0371	4.31	0.0044
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Benzo(K)Fluoranthene	Y	0.073	1220	981	0.0371	1.97	0.0020
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Chrysene	Y	0.28	826	844	0.0371	7.55	0.0089
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Fluoranthene	Y	0.3	23870	707	0.0371	8.09	0.0114
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Fluorene	N	---	26000	538	0.0371	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Naphthalene	N	---	61700	385	0.0371	---	---
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Phenanthrene	Y	0.047	34300	596	0.0371	1.27	0.0021
CFSDP-031-SD	CFSDP-031	0.00-0.50	10/18/2018	N	Pyrene	Y	0.21	9090	697	0.0371	5.66	0.0081
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Acenaphthene	N	---	33400	491	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Acenaphthylene	N	---	24000	452	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Anthracene	N	---	1300	594	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Benzo(A)Pyrene	N	---	3840	965	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Benzo(B)Fluoranthene	Y	0.042	2169	979	0.0040	10.53	0.0108
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Chrysene	Y	0.019	826	844	0.0040	4.76	0.0056
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Fluoranthene	Y	0.025	23870	707	0.0040	6.27	0.0089
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Fluorene	N	---	26000	538	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Naphthalene	N	---	61700	385	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Phenanthrene	N	---	34300	596	0.0040	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	11/3/2017	N	Pyrene	Y	0.027	9090	697	0.0040	6.77	0.0097
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Acenaphthene	N	---	33400	491	0.0068	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Acenaphthylene	N	---	24000	452	0.0068	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Anthracene	N	---	1300	594	0.0068	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Benzo(A)Anthracene	Y	0.013	4153	841	0.0068	1.90	0.0023
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Benzo(A)Pyrene	Y	0.013	3840	965	0.0068	1.90	0.0020
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Benzo(B)Fluoranthene	Y	0.03	2169	979	0.0068	4.39	0.0045
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0068	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Chrysene	Y	0.03	826	844	0.0068	4.39	0.0052
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Fluoranthene	Y	0.031	23870	707	0.0068	4.54	0.0064
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Fluorene	N	---	26000	538	0.0068	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Naphthalene	N	---	61700	385	0.0068	---	---
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Phenanthrene	Y	0.011	34300	596	0.0068	1.61	0.0027
CFSDP-032-SD	CFSDP-032	0.00-0.50	10/17/2018	N	Pyrene	Y	0.026	9090	697	0.0068	3.81	0.0055
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Acenaphthene	N	---	33400	491	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Acenaphthylene	N	---	24000	452	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Anthracene	N	---	1300	594	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Benzo(A)Pyrene	Y	0.08	3840	965	0.0029	28.07	0.0291
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Benzo(B)Fluoranthene	Y	0.2	2169	979	0.0029	70.18	0.0717
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0029	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Chrysene	Y	0.1	826	844	0.0029	35.09	0.0416
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Fluoranthene	Y	0.024	23870	707	0.0029	8.42	0.0119
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Fluorene	N	---	26000	538	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Naphthalene	N	---	61700	385	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Phenanthrene	N	---	34300	596	0.0029	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	11/3/2017	N	Pyrene	Y	0.035	9090	697	0.0029	12.28	0.0176
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Acenaphthene	N	---	33400	491	0.0102	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Acenaphthylene	N	---	24000	452	0.0102	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Anthracene	N	---	1300	594	0.0102	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Benzo(A)Anthracene	Y	0.011	4153	841	0.0102	1.08	0.0013
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Benzo(A)Pyrene	Y	0.013	3840	965	0.0102	1.27	0.0013
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Benzo(B)Fluoranthene	Y	0.021	2169	979	0.0102	2.06	0.0021
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Benzo(K)Fluoranthene	Y	0.0075	1220	981	0.0102	0.74	0.0007
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Chrysene	Y	0.021	826	844	0.0102	2.06	0.0024
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Fluoranthene	Y	0.023	23870	707	0.0102	2.25	0.0032
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Fluorene	N	---	26000	538	0.0102	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Naphthalene	N	---	61700	385	0.0102	---	---
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Phenanthrene	Y	0.01	34300	596	0.0102	0.98	0.0016
CFSDP-033-SD	CFSDP-033	0.00-0.50	10/17/2018	N	Pyrene	Y	0.019	9090	697	0.0102	1.86	0.0027
Flathead River Area												
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Acenaphthene	N	---	33400	491	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Acenaphthylene	N	---	24000	452	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Anthracene	N	---	1300	594	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Benzo(A)Anthracene	N	---	4153	841	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Benzo(A)Pyrene	N	---	3840	965	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Chrysene	Y	0.0041	826	844	0.0009	4.62	0.0055
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Fluoranthene	Y	0.004	23870	707	0.0009	4.50	0.0064
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Fluorene	N	---	26000	538	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Naphthalene	N	---	61700	385	0.0009	---	---
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Phenanthrene	Y	0.0039	34300	596	0.0009	4.39	0.0074
CFSDP-001-SD	CFSDP-001	0.00-0.50	10/5/2018	N	Pyrene	Y	0.0028	9090	697	0.0009	3.15	0.0045
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Acenaphthene	N	---	33400	491	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Acenaphthylene	N	---	24000	452	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Anthracene	N	---	1300	594	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Chrysene	N	---	826	844	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Fluoranthene	N	---	23870	707	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Fluorene	N	---	26000	538	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Naphthalene	N	---	61700	385	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Phenanthrene	N	---	34300	596	0.0090	---	---
CFSDP-001-SO	CFSDP-001	0.00-0.50	9/8/2016	N	Pyrene	N	---	9090	697	0.0090	---	---
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Acenaphthene	N	---	33400	491	0.0081	---	---
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Acenaphthylene	N	---	24000	452	0.0081	---	---
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Anthracene	N	---	1300	594	0.0081	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Benzo(A)Anthracene	Y	0.0038	4153	841	0.0081	0.47	0.0006
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Benzo(A)Pyrene	Y	0.0023	3840	965	0.0081	0.29	0.0003
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Benzo(B)Fluoranthene	Y	0.0071	2169	979	0.0081	0.88	0.0009
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Benzo(K)Fluoranthene	Y	0.0039	1220	981	0.0081	0.48	0.0005
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Chrysene	Y	0.0099	826	844	0.0081	1.23	0.0015
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Fluoranthene	Y	0.015	23870	707	0.0081	1.86	0.0026
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Fluorene	N	---	26000	538	0.0081	---	---
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Naphthalene	N	---	61700	385	0.0081	---	---
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Phenanthrene	Y	0.01	34300	596	0.0081	1.24	0.0021
CFSDP-002-SD	CFSDP-002	0.00-0.50	10/5/2018	N	Pyrene	Y	0.0093	9090	697	0.0081	1.16	0.0017
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Acenaphthene	N	---	33400	491	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Acenaphthylene	N	---	24000	452	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Anthracene	N	---	1300	594	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Chrysene	N	---	826	844	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Fluoranthene	N	---	23870	707	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Fluorene	N	---	26000	538	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Naphthalene	N	---	61700	385	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Phenanthrene	N	---	34300	596	0.0080	---	---
CFSDP-002-SO	CFSDP-002	0.00-0.50	9/8/2016	N	Pyrene	N	---	9090	697	0.0080	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Acenaphthene	N	---	33400	491	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Acenaphthylene	N	---	24000	452	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Anthracene	N	---	1300	594	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Benzo(A)Pyrene	Y	0.1	3840	965	0.0618	1.62	0.0017
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Benzo(B)Fluoranthene	Y	0.3	2169	979	0.0618	4.85	0.0050
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Benzo(K)Fluoranthene	Y	0.11	1220	981	0.0618	1.78	0.0018
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Chrysene	Y	0.48	826	844	0.0618	7.77	0.0092
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Fluoranthene	Y	0.48	23870	707	0.0618	7.77	0.0110
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Fluorene	N	---	26000	538	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Naphthalene	N	---	61700	385	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Phenanthrene	N	---	34300	596	0.0618	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	9/9/2016	N	Pyrene	Y	0.31	9090	697	0.0618	5.02	0.0072
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Acenaphthene	N	---	33400	491	0.0108	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Acenaphthylene	N	---	24000	452	0.0108	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Anthracene	N	---	1300	594	0.0108	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Benzo(A)Anthracene	Y	0.079	4153	841	0.0108	7.31	0.0087
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Benzo(A)Pyrene	N	---	3840	965	0.0108	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Benzo(B)Fluoranthene	Y	0.17	2169	979	0.0108	15.74	0.0161
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Benzo(K)Fluoranthene	Y	0.051	1220	981	0.0108	4.72	0.0048
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Chrysene	Y	0.21	826	844	0.0108	19.44	0.0230
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Fluoranthene	Y	0.27	23870	707	0.0108	25.00	0.0354
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Fluorene	N	---	26000	538	0.0108	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Naphthalene	N	---	61700	385	0.0108	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Phenanthrene	Y	0.044	34300	596	0.0108	4.07	0.0068
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/31/2017	N	Pyrene	Y	0.27	9090	697	0.0108	25.00	0.0359

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Acenaphthene	N	---	33400	491	0.0084	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Acenaphthylene	N	---	24000	452	0.0084	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Anthracene	Y	0.075	1300	594	0.0084	8.92	0.0150
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Benzo(A)Anthracene	Y	0.73	4153	841	0.0084	86.80	0.1032
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Benzo(A)Pyrene	Y	0.42	3840	965	0.0084	49.94	0.0518
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Benzo(B)Fluoranthene	Y	1.8	2169	979	0.0084	214.03	0.2186
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Benzo(K)Fluoranthene	Y	0.75	1220	981	0.0084	89.18	0.0909
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Chrysene	Y	2.7	826	844	0.0084	321.05	0.3804
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Fluoranthene	Y	1.5	23870	707	0.0084	178.36	0.2523
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Fluorene	N	---	26000	538	0.0084	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Naphthalene	N	---	61700	385	0.0084	---	---
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Phenanthrene	Y	0.25	34300	596	0.0084	29.73	0.0499
CFSDP-003-SD	CFSDP-003	0.00-0.50	10/4/2018	N	Pyrene	Y	1.3	9090	697	0.0084	154.58	0.2218
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Acenaphthene	N	---	33400	491	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Acenaphthylene	N	---	24000	452	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Anthracene	N	---	1300	594	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Chrysene	N	---	826	844	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Fluoranthene	N	---	23870	707	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Fluorene	N	---	26000	538	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Naphthalene	N	---	61700	385	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Phenanthrene	N	---	34300	596	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	9/9/2016	N	Pyrene	N	---	9090	697	0.0374	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Acenaphthene	N	---	33400	491	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Acenaphthylene	N	---	24000	452	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Anthracene	N	---	1300	594	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Benzo(A)Pyrene	N	---	3840	965	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Benzo(B)Fluoranthene	Y	0.082	2169	979	0.0256	3.20	0.0033
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Benzo(K)Fluoranthene	Y	0.027	1220	981	0.0256	1.05	0.0011
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Chrysene	Y	0.071	826	844	0.0256	2.77	0.0033
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Fluoranthene	Y	0.099	23870	707	0.0256	3.87	0.0055
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Fluorene	N	---	26000	538	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Naphthalene	N	---	61700	385	0.0256	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Phenanthrene	Y	0.024	34300	596	0.0256	0.94	0.0016
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/31/2017	N	Pyrene	Y	0.09	9090	697	0.0256	3.52	0.0050
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Acenaphthene	N	---	33400	491	4.57E-05	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Acenaphthylene	N	---	24000	452	4.57E-05	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Anthracene	N	---	1300	594	4.57E-05	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Benzo(A)Anthracene	Y	0.0076	4153	841	4.57E-05	166.30	0.1977
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Benzo(A)Pyrene	N	---	3840	965	4.57E-05	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Benzo(B)Fluoranthene	Y	0.017	2169	979	4.57E-05	371.99	0.3800
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Benzo(K)Fluoranthene	Y	0.0079	1220	981	4.57E-05	172.87	0.1762
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Chrysene	Y	0.025	826	844	4.57E-05	547.05	0.6482
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Fluoranthene	Y	0.025	23870	707	4.57E-05	547.05	0.7738
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Fluorene	N	---	26000	538	4.57E-05	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Naphthalene	N	---	61700	385	4.57E-05	---	---
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Phenanthrene	Y	0.0048	34300	596	4.57E-05	105.03	0.1762
CFSDP-004-SD	CFSDP-004	0.00-0.50	10/4/2018	N	Pyrene	Y	0.018	9090	697	4.57E-05	393.87	0.5651
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Acenaphthene	N	---	33400	491	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Acenaphthylene	N	---	24000	452	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Anthracene	N	---	1300	594	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Chrysene	N	---	826	844	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Fluoranthene	N	---	23870	707	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Fluorene	N	---	26000	538	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Naphthalene	N	---	61700	385	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Phenanthrene	N	---	34300	596	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	9/9/2016	N	Pyrene	N	---	9090	697	0.0267	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Acenaphthene	N	---	33400	491	0.0021	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Acenaphthylene	N	---	24000	452	0.0021	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Anthracene	N	---	1300	594	0.0021	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Benzo(A)Anthracene	N	---	4153	841	0.0021	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Benzo(A)Pyrene	Y	0.038	3840	965	0.0021	17.84	0.0185
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Benzo(B)Fluoranthene	Y	0.11	2169	979	0.0021	51.64	0.0528
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0021	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Chrysene	Y	0.13	826	844	0.0021	61.03	0.0723
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Fluoranthene	Y	0.14	23870	707	0.0021	65.73	0.0930
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Fluorene	N	---	26000	538	0.0021	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Naphthalene	Y	0.016	61700	385	0.0021	7.51	0.0195
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Phenanthrene	Y	0.022	34300	596	0.0021	10.33	0.0173
CFSDP-005-SD	CFSDP-005	0.00-0.50	11/1/2017	N	Pyrene	Y	0.1	9090	697	0.0021	46.95	0.0674
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Acenaphthene	Y	0.0011	33400	491	0.0057	0.19	0.0004
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Acenaphthylene	N	---	24000	452	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Anthracene	Y	0.0056	1300	594	0.0057	0.98	0.0017
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Benzo(A)Anthracene	Y	0.069	4153	841	0.0057	12.11	0.0144
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Benzo(A)Pyrene	Y	0.028	3840	965	0.0057	4.91	0.0051
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Benzo(B)Fluoranthene	Y	0.13	2169	979	0.0057	22.81	0.0233
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Benzo(G,H,I)Perylene	Y	0.036	648	1095	0.0057	6.32	0.0058
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Benzo(K)Fluoranthene	Y	0.11	1220	981	0.0057	19.30	0.0197
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Benzo[E]Pyrene	Y	0.077	4300	967	0.0057	13.51	0.0140
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C1-Chrysenes	Y	0.038	---	929	0.0057	6.67	0.0072
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C1-Fluoranthenes/Pyrenes	Y	0.067	---	770	0.0057	11.75	0.0153
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C1-Fluorenes	N	---	---	611	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C1-Naphthalenes	N	---	---	444	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C1-Phenanthrenes/Anthracen	Y	0.017	---	670	0.0057	2.98	0.0045
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C2-Chrysenes	Y	0.0082	---	1008	0.0057	1.44	0.0014
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C2-Fluorenes	N	---	---	686	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C2-Naphthalenes	N	---	---	510	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C2-Phenanthrenes/Anthracen	Y	0.012	---	746	0.0057	2.11	0.0028
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C3-Chrysenes	N	---	---	1112	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C3-Fluorenes	N	---	---	769	0.0057	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C3-Naphthalenes	Y	0.0051	---	581	0.0057	0.89	0.0015
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C3-Phenanthrenes/Anthracene	Y	0.0053	---	829	0.0057	0.93	0.0011
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C4 Chrysenes	N	---	---	1214	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C4-Naphthalenes	N	---	---	657	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	C4-Phenanthrenes/Anthracene	N	---	---	913	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Chrysene	Y	0.22	826	844	0.0057	38.60	0.0457
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Dibenz(A,H)Anthracene	Y	0.015	2389	1123	0.0057	2.63	0.0023
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Fluoranthene	Y	0.18	23870	707	0.0057	31.58	0.0447
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Fluorene	N	---	26000	538	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	0.04	---	1115	0.0057	7.02	0.0063
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Naphthalene	N	---	61700	385	0.0057	---	---
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Perylene	Y	0.012	431	967	0.0057	2.11	0.0022
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Phenanthrene	Y	0.026	34300	596	0.0057	4.56	0.0077
CFSDP-005-SD	CFSDP-005	0.00-0.50	10/18/2018	N	Pyrene	Y	0.18	9090	697	0.0057	31.58	0.0453
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Acenaphthene	N	---	33400	491	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Acenaphthylene	N	---	24000	452	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Anthracene	N	---	1300	594	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Chrysene	N	---	826	844	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Fluoranthene	N	---	23870	707	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Fluorene	N	---	26000	538	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Naphthalene	N	---	61700	385	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Phenanthrene	N	---	34300	596	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	9/9/2016	N	Pyrene	N	---	9090	697	0.0041	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Acenaphthene	N	---	33400	491	0.0006	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Acenaphthylene	N	---	24000	452	0.0006	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Anthracene	N	---	1300	594	0.0006	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Benzo(A)Anthracene	Y	0.0016	4153	841	0.0006	2.67	0.0032
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Benzo(A)Pyrene	Y	0.0014	3840	965	0.0006	2.34	0.0024
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Benzo(B)Fluoranthene	Y	0.0038	2169	979	0.0006	6.34	0.0065
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Benzo(K)Fluoranthene	Y	0.0015	1220	981	0.0006	2.50	0.0026
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Chrysene	Y	0.0041	826	844	0.0006	6.84	0.0081
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Fluoranthene	Y	0.0049	23870	707	0.0006	8.18	0.0116
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Fluorene	N	---	26000	538	0.0006	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Naphthalene	N	---	61700	385	0.0006	---	---
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Phenanthrene	Y	0.0022	34300	596	0.0006	3.67	0.0062
CFSDP-006-SD	CFSDP-006	0.00-0.50	10/4/2018	N	Pyrene	Y	0.0039	9090	697	0.0006	6.51	0.0093
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Acenaphthene	N	---	33400	491	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Acenaphthylene	N	---	24000	452	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Anthracene	N	---	1300	594	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Benzo(A)Anthracene	Y	0.00095	4153	841	4.76E-05	19.98	0.0238
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Benzo(A)Pyrene	N	---	3840	965	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Benzo(B)Fluoranthene	Y	0.0014	2169	979	4.76E-05	29.44	0.0301
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Chrysene	Y	0.0014	826	844	4.76E-05	29.44	0.0349
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Fluoranthene	Y	0.0021	23870	707	4.76E-05	44.16	0.0625

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Fluorene	N	---	26000	538	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Naphthalene	N	---	61700	385	4.76E-05	---	---
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Phenanthrene	Y	0.0019	34300	596	4.76E-05	39.96	0.0670
CFSDP-007-SD	CFSDP-007	0.00-0.50	10/3/2018	N	Pyrene	Y	0.0014	9090	697	4.76E-05	29.44	0.0422
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Acenaphthene	N	---	33400	491	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Acenaphthylene	N	---	24000	452	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Anthracene	N	---	1300	594	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Chrysene	N	---	826	844	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Fluoranthene	N	---	23870	707	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Fluorene	N	---	26000	538	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Naphthalene	N	---	61700	385	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Phenanthrene	N	---	34300	596	0.0150	---	---
CFSDP-007-SO	CFSDP-007	0.00-0.50	9/8/2016	N	Pyrene	N	---	9090	697	0.0150	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Acenaphthene	N	---	33400	491	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Acenaphthylene	N	---	24000	452	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Anthracene	N	---	1300	594	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Benzo(A)Anthracene	N	---	4153	841	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Benzo(A)Pyrene	N	---	3840	965	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Benzo(B)Fluoranthene	N	---	2169	979	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Chrysene	N	---	826	844	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Fluoranthene	N	---	23870	707	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Fluorene	N	---	26000	538	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Naphthalene	N	---	61700	385	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Phenanthrene	N	---	34300	596	3.86E-05	---	---
CFSDP-008-SD	CFSDP-008	0.00-0.50	10/3/2018	N	Pyrene	N	---	9090	697	3.86E-05	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Acenaphthene	N	---	33400	491	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Acenaphthylene	N	---	24000	452	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Anthracene	N	---	1300	594	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Chrysene	N	---	826	844	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Fluoranthene	N	---	23870	707	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Fluorene	N	---	26000	538	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Naphthalene	N	---	61700	385	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Phenanthrene	N	---	34300	596	0.0088	---	---
CFSDP-008-SO	CFSDP-008	0.00-0.50	9/8/2016	N	Pyrene	N	---	9090	697	0.0088	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Acenaphthene	N	---	33400	491	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Acenaphthylene	N	---	24000	452	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Anthracene	N	---	1300	594	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Benzo(A)Anthracene	N	---	4153	841	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Benzo(A)Pyrene	N	---	3840	965	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Benzo(B)Fluoranthene	Y	0.0024	2169	979	0.0004	6.47	0.0066

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Chrysene	Y	0.003	826	844	0.0004	8.09	0.0096
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Fluoranthene	Y	0.0047	23870	707	0.0004	12.67	0.0179
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Fluorene	N	---	26000	538	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Naphthalene	N	---	61700	385	0.0004	---	---
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Phenanthrene	Y	0.0032	34300	596	0.0004	8.63	0.0145
CFSDP-017-SD	CFSDP-017	0.00-0.50	10/3/2018	N	Pyrene	Y	0.0032	9090	697	0.0004	8.63	0.0124
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Acenaphthene	N	---	33400	491	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Acenaphthylene	N	---	24000	452	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Anthracene	N	---	1300	594	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Benzo(A)Anthracene	N	---	4153	841	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Benzo(A)Pyrene	N	---	3840	965	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Benzo(B)Fluoranthene	N	---	2169	979	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Benzo(K)Fluoranthene	N	---	1220	981	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Chrysene	N	---	826	844	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Fluoranthene	N	---	23870	707	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Fluorene	N	---	26000	538	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Naphthalene	N	---	61700	385	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Phenanthrene	N	---	34300	596	0.0076	---	---
CFSDP-017-SO	CFSDP-017	0.00-0.50	9/8/2016	N	Pyrene	N	---	9090	697	0.0076	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Acenaphthene	N	---	33400	491	0.0049	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Acenaphthylene	N	---	24000	452	0.0049	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Anthracene	N	---	1300	594	0.0049	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Benzo(A)Anthracene	Y	0.13	4153	841	0.0049	26.48	0.0315
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Benzo(A)Pyrene	N	---	3840	965	0.0049	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Benzo(B)Fluoranthene	Y	0.27	2169	979	0.0049	54.99	0.0562
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Benzo(K)Fluoranthene	Y	0.088	1220	981	0.0049	17.92	0.0183
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Chrysene	Y	0.3	826	844	0.0049	61.10	0.0724
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Fluoranthene	Y	0.37	23870	707	0.0049	75.36	0.1066
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Fluorene	N	---	26000	538	0.0049	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Naphthalene	N	---	61700	385	0.0049	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Phenanthrene	Y	0.053	34300	596	0.0049	10.79	0.0181
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/31/2017	N	Pyrene	Y	0.39	9090	697	0.0049	79.43	0.1140
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Acenaphthene	Y	0.023	33400	491	0.0095	2.42	0.0049
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Acenaphthylene	N	---	24000	452	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Anthracene	Y	0.11	1300	594	0.0095	11.58	0.0195
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Benzo(A)Anthracene	Y	1.4	4153	841	0.0095	147.37	0.1752
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Benzo(A)Pyrene	Y	0.59	3840	965	0.0095	62.11	0.0644
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Benzo(B)Fluoranthene	Y	2.7	2169	979	0.0095	284.21	0.2903
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Benzo(G,H,I)Perylene	Y	0.67	648	1095	0.0095	70.53	0.0644
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Benzo(K)Fluoranthene	Y	1.9	1220	981	0.0095	200.00	0.2039
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Benzo[E]Pyrene	Y	1.5	4300	967	0.0095	157.89	0.1633
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C1-Chrysenes	Y	0.76	---	929	0.0095	80.00	0.0861
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C1-Fluoranthenes/Pyrenes	Y	1.4	---	770	0.0095	147.37	0.1914
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C1-Fluorenes	N	---	---	611	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C1-Naphthalenes	N	---	---	444	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C1-Phenanthrenes/Anthracen	Y	0.33	---	670	0.0095	34.74	0.0518
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C2-Chrysenes	Y	0.17	---	1008	0.0095	17.89	0.0178
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C2-Fluorenes	N	---	---	686	0.0095	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C2-Naphthalenes	N	---	---	510	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C2-Phenanthrenes/Anthracen	Y	0.22	---	746	0.0095	23.16	0.0310
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C3-Chrysenes	N	---	---	1112	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C3-Fluorenes	N	---	---	769	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C3-Naphthalenes	N	---	---	581	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C3-Phenanthrenes/Anthracen	N	---	---	829	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C4 Chrysenes	N	---	---	1214	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C4-Naphthalenes	N	---	---	657	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Chrysene	Y	4.3	826	844	0.0095	452.63	0.5363
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Dibenz(A,H)Anthracene	Y	0.23	2389	1123	0.0095	24.21	0.0216
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Fluoranthene	Y	4.2	23870	707	0.0095	442.11	0.6253
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Fluorene	N	---	26000	538	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	0.72	---	1115	0.0095	75.79	0.0680
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Naphthalene	N	---	61700	385	0.0095	---	---
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Perylene	Y	0.17	431	967	0.0095	17.89	0.0185
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Phenanthrene	Y	0.44	34300	596	0.0095	46.32	0.0777
CFSDP-026-SD	CFSDP-026	0.00-0.50	10/5/2018	N	Pyrene	Y	3.5	9090	697	0.0095	368.42	0.5286
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Acenaphthene	Y	0.033	33400	491	0.0446	0.74	0.0015
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Acenaphthylene	N	---	24000	452	0.0446	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Anthracene	Y	0.16	1300	594	0.0446	3.59	0.0060
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Benzo(A)Anthracene	Y	2.1	4153	841	0.0446	47.09	0.0560
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Benzo(A)Pyrene	Y	0.87	3840	965	0.0446	19.51	0.0202
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Benzo(B)Fluoranthene	Y	4.1	2169	979	0.0446	91.93	0.0939
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Benzo(K)Fluoranthene	Y	1.3	1220	981	0.0446	29.15	0.0297
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Chrysene	Y	4.9	826	844	0.0446	109.87	0.1302
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Fluoranthene	Y	6.5	23870	707	0.0446	145.74	0.2061
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Fluorene	Y	0.03	26000	538	0.0446	0.67	0.0013
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Naphthalene	Y	0.019	61700	385	0.0446	0.43	0.0011
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Phenanthrene	Y	1	34300	596	0.0446	22.42	0.0376
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/31/2017	N	Pyrene	Y	6.8	9090	697	0.0446	152.47	0.2187
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Acenaphthene	Y	0.0031	33400	491	0.0184	0.17	0.0003
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Acenaphthylene	N	---	24000	452	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Anthracene	Y	0.013	1300	594	0.0184	0.71	0.0012
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Benzo(A)Anthracene	Y	0.23	4153	841	0.0184	12.50	0.0149
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Benzo(A)Pyrene	Y	0.11	3840	965	0.0184	5.98	0.0062
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Benzo(B)Fluoranthene	Y	0.43	2169	979	0.0184	23.37	0.0239
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Benzo(G,H,I)Perylene	Y	0.13	648	1095	0.0184	7.07	0.0065
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Benzo(K)Fluoranthene	Y	0.34	1220	981	0.0184	18.48	0.0188
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Benzo[E]Pyrene	Y	0.25	4300	967	0.0184	13.59	0.0141
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C1-Chrysenes	Y	0.12	---	929	0.0184	6.52	0.0070
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C1-Fluoranthenes/Pyrenes	Y	0.2	---	770	0.0184	10.87	0.0141
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C1-Fluorenes	N	---	---	611	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C1-Naphthalenes	N	---	---	444	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C1-Phenanthrenes/Anthracen	Y	0.044	---	670	0.0184	2.39	0.0036
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C2-Chrysenes	Y	0.024	---	1008	0.0184	1.30	0.0013
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C2-Fluorenes	N	---	---	686	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C2-Naphthalenes	N	---	---	510	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C2-Phenanthrenes/Anthracen	Y	0.029	---	746	0.0184	1.58	0.0021

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C3-Chrysenes	N	---	---	1112	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C3-Fluorenes	N	---	---	769	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C3-Naphthalenes	N	---	---	581	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C3-Phenanthrenes/Anthracen	N	---	---	829	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C4 Chrysenes	N	---	---	1214	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C4-Naphthalenes	N	---	---	657	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Chrysene	Y	0.62	826	844	0.0184	33.70	0.0399
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Dibenz(A,H)Anthracene	Y	0.045	2389	1123	0.0184	2.45	0.0022
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Fluoranthene	Y	0.55	23870	707	0.0184	29.89	0.0423
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Fluorene	N	---	26000	538	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	0.14	---	1115	0.0184	7.61	0.0068
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Naphthalene	N	---	61700	385	0.0184	---	---
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Perylene	Y	0.035	431	967	0.0184	1.90	0.0020
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Phenanthrene	Y	0.065	34300	596	0.0184	3.53	0.0059
CFSDP-027-SD	CFSDP-027	0.00-0.50	10/5/2018	N	Pyrene	Y	0.45	9090	697	0.0184	24.46	0.0351
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Acenaphthene	N	---	33400	491	0.0175	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Acenaphthylene	N	---	24000	452	0.0175	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Anthracene	N	---	1300	594	0.0175	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Benzo(A)Anthracene	Y	0.084	4153	841	0.0175	4.80	0.0057
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Benzo(A)Pyrene	Y	0.055	3840	965	0.0175	3.14	0.0033
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Benzo(B)Fluoranthene	Y	0.17	2169	979	0.0175	9.71	0.0099
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Benzo(K)Fluoranthene	Y	0.059	1220	981	0.0175	3.37	0.0034
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Chrysene	Y	0.18	826	844	0.0175	10.29	0.0122
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Fluoranthene	Y	0.17	23870	707	0.0175	9.71	0.0137
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Fluorene	N	---	26000	538	0.0175	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Naphthalene	N	---	61700	385	0.0175	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Phenanthrene	Y	0.05	34300	596	0.0175	2.86	0.0048
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/31/2017	N	Pyrene	Y	0.18	9090	697	0.0175	10.29	0.0148
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Acenaphthene	N	---	33400	491	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Acenaphthylene	N	---	24000	452	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Anthracene	Y	0.048	1300	594	0.0048	9.94	0.0167
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Benzo(A)Anthracene	Y	0.32	4153	841	0.0048	66.25	0.0788
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Benzo(A)Pyrene	Y	0.1	3840	965	0.0048	20.70	0.0215
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Benzo(B)Fluoranthene	Y	0.47	2169	979	0.0048	97.31	0.0994
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Benzo(G,H,I)Perylene	Y	0.12	648	1095	0.0048	24.84	0.0227
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Benzo(K)Fluoranthene	Y	0.36	1220	981	0.0048	74.53	0.0760
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Benzo[E]Pyrene	Y	0.26	4300	967	0.0048	53.83	0.0557
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C1-Chrysenes	Y	0.15	---	929	0.0048	31.06	0.0334
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C1-Fluoranthenes/Pyrenes	Y	0.49	---	770	0.0048	101.45	0.1318
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C1-Fluorenes	N	---	---	611	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C1-Naphthalenes	N	---	---	444	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C1-Phenanthrenes/Anthracen	Y	0.18	---	670	0.0048	37.27	0.0556
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C2-Chrysenes	N	---	---	1008	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C2-Fluorenes	N	---	---	686	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C2-Naphthalenes	N	---	---	510	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C2-Phenanthrenes/Anthracen	Y	0.072	---	746	0.0048	14.91	0.0200
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C3-Chrysenes	N	---	---	1112	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C3-Fluorenes	N	---	---	769	0.0048	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C3-Naphthalenes	N	---	---	581	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C3-Phenanthrenes/Anthracen	N	---	---	829	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C4 Chrysenes	N	---	---	1214	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C4-Naphthalenes	N	---	---	657	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	C4-Phenanthrenes/Anthracen	N	---	---	913	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Chrysene	Y	0.83	826	844	0.0048	171.84	0.2036
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Dibenz(A,H)Anthracene	Y	0.043	2389	1123	0.0048	8.90	0.0079
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Fluoranthene	Y	1.8	23870	707	0.0048	372.67	0.5271
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Fluorene	N	---	26000	538	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	0.13	---	1115	0.0048	26.92	0.0241
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Naphthalene	N	---	61700	385	0.0048	---	---
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Perylene	Y	0.033	431	967	0.0048	6.83	0.0071
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Phenanthrene	Y	0.47	34300	596	0.0048	97.31	0.1633
CFSDP-028-SD	CFSDP-028	0.00-0.50	10/4/2018	N	Pyrene	Y	1	9090	697	0.0048	207.04	0.2970
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Acenaphthene	N	---	33400	491	0.0061	---	---
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Acenaphthylene	N	---	24000	452	0.0061	---	---
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Anthracene	Y	0.0012	1300	594	0.0061	0.20	0.0003
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Benzo(A)Anthracene	Y	0.0053	4153	841	0.0061	0.88	0.0010
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Benzo(A)Pyrene	Y	0.0042	3840	965	0.0061	0.69	0.0007
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Benzo(B)Fluoranthene	Y	0.014	2169	979	0.0061	2.31	0.0024
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Benzo(K)Fluoranthene	Y	0.0041	1220	981	0.0061	0.68	0.0007
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Chrysene	Y	0.019	826	844	0.0061	3.14	0.0037
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Fluoranthene	Y	0.014	23870	707	0.0061	2.31	0.0033
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Fluorene	N	---	26000	538	0.0061	---	---
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Naphthalene	N	---	61700	385	0.0061	---	---
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Phenanthrene	Y	0.0056	34300	596	0.0061	0.93	0.0016
CFSDP-034-SD	CFSDP-034	0.00-0.50	10/5/2018	N	Pyrene	Y	0.0084	9090	697	0.0061	1.39	0.0020
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Acenaphthene	Y	0.0014	33400	491	0.0116	0.12	0.0002
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Acenaphthylene	N	---	24000	452	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Anthracene	Y	0.0055	1300	594	0.0116	0.47	0.0008
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Benzo(A)Anthracene	Y	0.07	4153	841	0.0116	6.03	0.0072
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Benzo(A)Pyrene	Y	0.043	3840	965	0.0116	3.71	0.0038
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Benzo(B)Fluoranthene	Y	0.18	2169	979	0.0116	15.52	0.0159
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Benzo(G,H,I)Perylene	Y	0.056	648	1095	0.0116	4.83	0.0044
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Benzo(K)Fluoranthene	Y	0.12	1220	981	0.0116	10.34	0.0105
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Benzo[E]Pyrene	Y	0.1	4300	967	0.0116	8.62	0.0089
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C1-Chrysenes	Y	0.035	---	929	0.0116	3.02	0.0032
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C1-Fluoranthenes/Pyrenes	Y	0.057	---	770	0.0116	4.91	0.0064
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C1-Fluorenes	N	---	---	611	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C1-Naphthalenes	N	---	---	444	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C1-Phenanthrenes/Anthracen	Y	0.016	---	670	0.0116	1.38	0.0021
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C2-Chrysenes	Y	0.0085	---	1008	0.0116	0.73	0.0007
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C2-Fluorenes	N	---	---	686	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C2-Naphthalenes	N	---	---	510	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C2-Phenanthrenes/Anthracen	Y	0.0088	---	746	0.0116	0.76	0.0010
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C3-Chrysenes	N	---	---	1112	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C3-Fluorenes	N	---	---	769	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C3-Naphthalenes	N	---	---	581	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C3-Phenanthrenes/Anthracen	N	---	---	829	0.0116	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAH_i,Maxi} (mg/kg _{OC})	C _{OC,PAH_i,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C4 Chrysenes	N	---	---	1214	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C4-Naphthalenes	N	---	---	657	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	C4-Phenanthrenes/Anthracene	N	---	---	913	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Chrysene	Y	0.26	826	844	0.0116	22.41	0.0266
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Dibenz(A,H)Anthracene	Y	0.018	2389	1123	0.0116	1.55	0.0014
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Fluoranthene	Y	0.19	23870	707	0.0116	16.38	0.0232
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Fluorene	N	---	26000	538	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Indeno(1,2,3-C,D)Pyrene	Y	0.057	---	1115	0.0116	4.91	0.0044
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Naphthalene	N	---	61700	385	0.0116	---	---
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Perylene	Y	0.012	431	967	0.0116	1.03	0.0011
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Phenanthrene	Y	0.026	34300	596	0.0116	2.24	0.0038
CFSDP-035-SD	CFSDP-035	0.00-0.50	10/5/2018	N	Pyrene	Y	0.16	9090	697	0.0116	13.79	0.0198
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Acenaphthene	N	---	33400	491	0.0002	---	---
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Acenaphthylene	N	---	24000	452	0.0002	---	---
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Anthracene	Y	0.0086	1300	594	0.0002	56.21	0.0946
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Benzo(A)Anthracene	Y	0.07	4153	841	0.0002	457.52	0.5440
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Benzo(A)Pyrene	Y	0.044	3840	965	0.0002	287.58	0.2980
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Benzo(B)Fluoranthene	Y	0.24	2169	979	0.0002	1568.63	1.6023
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Benzo(K)Fluoranthene	Y	0.072	1220	981	0.0002	470.59	0.4797
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Chrysene	Y	0.3	826	844	0.0002	1960.78	0.9787
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Fluoranthene	Y	0.37	23870	707	0.0002	2418.30	3.4205
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Fluorene	N	---	26000	538	0.0002	---	---
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Naphthalene	N	---	61700	385	0.0002	---	---
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Phenanthrene	Y	0.038	34300	596	0.0002	248.37	0.4167
CFSDP-036-SD	CFSDP-036	0.00-0.50	10/4/2018	N	Pyrene	Y	0.21	9090	697	0.0002	1372.55	1.9692
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Acenaphthene	N	---	33400	491	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Acenaphthylene	N	---	24000	452	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Anthracene	N	---	1300	594	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Benzo(A)Anthracene	N	---	4153	841	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Benzo(A)Pyrene	N	---	3840	965	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Benzo(B)Fluoranthene	N	---	2169	979	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Chrysene	N	---	826	844	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Fluoranthene	N	---	23870	707	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Fluorene	N	---	26000	538	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Naphthalene	N	---	61700	385	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Phenanthrene	N	---	34300	596	4.57E-05	---	---
CFSDP-037-SD	CFSDP-037	0.00-0.50	10/3/2018	N	Pyrene	N	---	9090	697	4.57E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Acenaphthene	N	---	33400	491	4.74E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Acenaphthylene	N	---	24000	452	4.74E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Anthracene	N	---	1300	594	4.74E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Benzo(A)Anthracene	Y	0.0011	4153	841	4.74E-05	23.21	0.0276
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Benzo(A)Pyrene	N	---	3840	965	4.74E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Benzo(B)Fluoranthene	Y	0.0012	2169	979	4.74E-05	25.32	0.0259
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Benzo(K)Fluoranthene	N	---	1220	981	4.74E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Chrysene	Y	0.0013	826	844	4.74E-05	27.43	0.0325
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Fluoranthene	Y	0.0011	23870	707	4.74E-05	23.21	0.0328
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Fluorene	N	---	26000	538	4.74E-05	---	---
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Naphthalene	N	---	61700	385	4.74E-05	---	---

Table G-2
Equilibrium Partitioning Sediment Benchmark Toxicity Unit Calculations for PAH Mixtures
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	Location ID	Depth interval (ft)	Sample Date	Sample Type	Constituent	Detected (Y/N)	Result Value (mg/kg)	C _{OC,PAHi,Maxi} (mg/kg _{OC})	C _{OC,PAHi,FCVi} (mg/kg _{OC})	f _{OC}	C _{OC} (mg/kg _{OC})	ESBTU _{FCVi}
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Phenanthrene	Y	0.0019	34300	596	4.74E-05	40.08	0.0673
CFSDP-038-SD	CFSDP-038	0.00-0.50	10/3/2018	N	Pyrene	N	---	9090	697	4.74E-05	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Acenaphthene	N	---	33400	491	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Acenaphthylene	N	---	24000	452	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Anthracene	N	---	1300	594	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Benzo(A)Anthracene	N	---	4153	841	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Benzo(A)Pyrene	N	---	3840	965	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Benzo(B)Fluoranthene	N	---	2169	979	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Benzo(K)Fluoranthene	N	---	1220	981	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Chrysene	N	---	826	844	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Fluoranthene	N	---	23870	707	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Fluorene	N	---	26000	538	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Naphthalene	N	---	61700	385	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Phenanthrene	N	---	34300	596	0.0016	---	---
CFSDP-DUP3-SD	CFSDP-005	0.00-0.50	11/1/2017	FD	Pyrene	N	---	9090	697	0.0016	---	---

Notes:
---: Not available
C_{OC,PAHi,FCVi}: Effect concentration of a PAH in sediment on an organic carbon basis calculated from the product of its FCV and KOC
C_{OC,PAHi,Maxi}: Maximum solubility limited PAH concentration in sediment on an organic carbon basis
FCV: Final Chronic Value
FD: Duplicate Sample
f_{OC}: Fraction Organic Carbon
N: Normal (Primary) Sample
ESBTU_{FCVi}: Equilibrium Partitioning Sediment Benchmark Toxic Unit, based on the FCV
C_{OC}: Organic Carbon normalized PAH concentration
mg/kg: milligram per kilogram
PAH: Polycyclic Aromatic Hydrocarbons



Appendix H Food Chain Models for Calculating Doses to Representative Ecological Receptors



Appendix H0 Food Chain Model Parameters

Table H0-1
Summary of Bioaccumulative COPECs for Evaluation in Wildlife Exposure Modeling
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Detected Chemicals	CAS Number	log K _{ow} USEPA EPISUITE	COPECs by Matrix			Bioaccumulative COPEC Lists				Wildlife Ingestion COPEC
			Soil	Sediment	Surface Water	log K _{ow} > 3.5?	USEPA 2017 PBT Constituents	USEPA 2000 Important Bioaccumulative Constituents	EPA Eco-SSL Wildlife Value	
Metals										
Aluminum		NA	●	●	●	NA			Narrative Statement	Yes
Antimony		NA	●	●	●	NA			Yes	Yes
Arsenic		NA	●	●	●	NA		Yes	Yes	Yes
Barium		NA	●	●	●	NA			Yes	Yes
Beryllium		NA	●	●	●	NA			Yes	Yes
Cadmium		NA	●	●	●	NA		Yes	Yes	Yes
Chromium		NA	●	●	●	NA		Yes	Yes	Yes
Cobalt		NA	●	●	●	NA			Yes	Yes
Copper		NA	●	●	●	NA		Yes	Yes	Yes
Lead		NA	●	●	●	NA	Yes	Yes	Yes	Yes
Manganese		NA	●	●	●	NA			Yes	Yes
Mercury		NA	●	●	●	NA	Yes	Yes	Yes	Yes
Nickel		NA	●	●	●	NA		Yes	Yes	Yes
Selenium		NA	●	●	●	NA		Yes	Yes	Yes
Silver		NA		●		NA		Yes	Yes	Yes
Thallium		NA	●	●	●	NA				Yes
Vanadium		NA	●	●	●	NA			Yes	Yes
Zinc		NA	●	●	●	NA		Yes	Yes	Yes
Other Inorganics										
Cyanide		NA	●	●	●	NA				Yes
Fluoride		NA	●	●	●	NA				Yes
PCBs										
Aroclor 1248	12672-29-6	6.34	●				Yes	Yes		Yes
Aroclor 1254	11097-69-1	6.98	●				Yes	Yes		Yes
PAHs										
Total HMW- PAHs		NA	●	●	●	NA	Yes	Yes	Yes	Yes
Total LMW- PAHs		NA	●	●	●	NA	Yes	Yes	Yes	Yes
Dioxin and Dioxin-Like Compounds										
Dioxin and Dioxin-Like Compounds		NA	●			NA	Yes	Yes		Yes
Non-PAH SVOCs										
2,4-Dimethylphenol	105679	2.6074	●			No				
2-Methylphenol	7440-66-6	2.06		●		No				
3- And 4- Methylphenol (Total)	XXXX		●	●	●	No				
4-Nitroaniline	100-01-6	1.47	●			No				
Acetophenone	98-86-2	1.67		●		No				
Benzaldehyde	100-52-7	1.71		●	●	No				
Biphenyl (Diphenyl)	92-52-4	3.76	●			Yes				Yes
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	111-44-4	1.56	●			No				
Bis(2-ethylhexyl)phthalate	117817	8.3918	●	●	●	Yes				Yes
Butylbenzylphthalate	85687	4.8445	●	●	●	Yes				Yes

Table H0-1
Summary of Bioaccumulative COPECs for Evaluation in Wildlife Exposure Modeling
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Detected Chemicals	CAS Number	log K _{ow} USEPA EPISUITE	COPECs by Matrix			Bioaccumulative COPEC Lists				Wildlife Ingestion COPEC
			Soil	Sediment	Surface Water	log K _{ow} > 3.5?	USEPA 2017 PBT Constituents	USEPA 2000 Important Bioaccumulative Constituents	EPA Eco-SSL Wildlife Value	
Caprolactam	105-60-2	0.66	●		●	No				
Carbazole	86-74-8	3.23	●	●	●	No				
Dibenzofuran	132649	3.7147	●	●		Yes				Yes
Diethyl phthalate	84-66-2	2.65	●	●		No				
Di-n-butyl phthalate	84742	4.61	●	●		Yes				Yes
Di-n-octyl phthalate	84742	8.54	●	●	●	Yes				Yes
Hexachlorobenzene	118741	5.86	●			Yes	Yes	Yes		Yes
Isophorone	78-59-1	2.62	●	●		No				
Pentachlorophenol	87865	4.7353	●			Yes		Yes	Yes	Yes
Phenol	108952	1.5128	●	●	●	No				
Volatile Organic Compounds (VOCs)										
1,2-Dichloroethane	107-06-2	1.83	●			No				
1,4-Dichlorobenzene	106-46-7	3.28	●			No				
2-Hexanone	591-78-6	1.24	●			No				
Acetone	67-64-1	-0.24	●	●	●	No				
Benzene	71-43-2	1.99	●	●		No				
Bromomethane	74-83-9	1.18	●			No				
Carbon Disulfide	75-15-0	1.94	●	●		No				
Cyclohexane	110-82-7	3.18	●	●		No				
Ethylbenzene	100-41-4	3.03	●	●		No				
Isopropylbenzene	98-82-8	3.45	●			No				
m,p-Xylene	79601-23-1	3.09	●	●		No				
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.26	●	●		No				
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	1.16	●			No				
Methylacetate	79-20-9	0.37	●	●		No				
Methylcyclohexane	108-87-2	3.59	●	●		Yes				Yes
Methylene Chloride	75-09-2	1.34	●	●	●	No				
o-Xylene	95-47-6	3.09	●	●		No				
Styrene	100-42-5	2.89	●		●	No				
Tetrachloroethylene (PCE)	127-18-4	2.97	●	●		No				
Toluene	108-88-3	2.54	●	●	●	No				
Trichlorofluoromethane	75-69-4	2.13	●			No				

Notes:

= Chemical not bioaccumulative

Table H0-2
Summary of Exposure Parameters for Wildlife Receptors of Concern
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Representative Species			Foraging Range ^a	Foraging Range Reference	Area Use Factor (AUF)		Body Weight (kg wet weight)			Dietary Composition					Ingestion Rates							
										Plant Material	Invertebrates	Fish	Small Mammals	Dietary Composition Reference	Dietary		Drinking Water		Incidental Substrate			
Common Name	Scientific Name	Food-web classification			Preliminary	Refined	Mean	±SD	Body Weight Reference						kg dry weight/day	Reference	L/day	Reference	Avg. % of Dry Intake	± SD % of Dry Intake	kg dry weight/day	Reference
Avian Receptors																						
American Dipper	<i>Cinclus mexicanus</i>	semi-aquatic passerine invertivore	0.32 km	Bakus (1959)	1.0	Area specific	0.0546	0.0048	Dunning (2008)		100%			Ealey (1977)	0.0091	Nagy (2001) ^b	0.0084	Caulder and Braun (1983)	2%	---	0.0002	Assumption ^m
American Woodcock	<i>Scolopax minor</i>	small soil probing invertivore	11.1 ac	Gregg (1984); USCHPPM (2004)	1.0	Area specific	0.176	---	Dunning (2008)	10%	90%			Sample and Suter (1994)	0.021	Nagy (2001) ^b	0.018	Caulder and Braun (1983)	7.5%	6.9%	0.0016	USEPA (2005)
Belted Kingfisher	<i>Ceryle alcyon</i>	small aquatic piscivore	1.03 km	USCHPPM (2004)	1.0	Area specific	0.148	0.0208	Dunning (2008)		10%	90%		Sample and Suter (1994)	0.023	Nagy (2001) ^d	0.016	Caulder and Braun (1983)	0%	---	0	Sample and Suter (1994) ^h
Mourning Dove	<i>Zenaida macroura</i>	small herbivore	1.6 km	Tomlinson et al. (1960)	1.0	Area specific	0.115	0.0018	Dunning (2008)	100%				USEPA (2005)	0.013	Nagy (2001) ^c	0.014	Caulder and Braun (1983)	6.8%	5.3%	0.00089	USEPA (2005) ^l
Red-tailed Hawk	<i>Buteo jamaicensis</i>	large carnivore	551 ac	Sample and Suter (1994)	1.0	Area specific	1.028	---	Dunning (2008)				100%	Sample and Suter (1994)	0.084	Nagy (2001) ^d	0.060	Caulder and Braun (1983)	2.6%	2.3%	0.0022	USEPA (2005)
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	terrestrial insectivore (Special Status)	42 ac	USFWS (2017a)	1.0	Area specific	0.064	0.0091	Dunning (2008)		100%			USEPA (1993)	0.010	Nagy (2001) ^b	0.0094	Caulder and Braun (1983)	0%	---	0	Assumption ⁿ
Mammalian Receptors																						
Canada Lynx	<i>Lynx canadensis</i>	medium carnivore (Special Status)	10,625 ac	USFWS (2017b)	1.0	Area specific	6.0	---	USFWS (2017b)				100%	USFWS (2017b)	0.187	Nagy (2001) ^e	0.497	Caulder and Braun (1983)	2.8%	0.08%	0.005	Beyer et al. (1994) ^l
Grizzly Bear	<i>Ursus arctos horribilis</i>	large carnivore (Special Status)	32,000 ac	USFWS (2007)	1.0	Area specific	90.7	---	USFWS (2007)	65%	15%	10%	10%	USFWS (2007), NPS (2018)	1.959	Nagy (2001) ^e	5.721	Caulder and Braun (1983)	2.8%	0.08%	0.055	Beyer et al. (1994) ^l
Long-tailed Weasel	<i>Mustela frenata</i>	small carnivore	12 ac	USCHPPM (2004)	1.0	Area specific	0.153	0.003	Brown and Lasiewski (1972), as cited in USCHPPM (2004)				100%	USCHPPM (2004)	0.0079	Nagy (2001) ^e	0.018	Caulder and Braun (1983)	1.6%	2.1%	0.0001	USEPA (2005)
Meadow Vole	<i>Microtus pennsylvanicus</i>	small terrestrial herbivore	0.13 ac	McCann (1976) ^k	1.0	Area specific	0.033	0.0082	Brochu et al. (1983), as cited in USEPA (1993)	100%				USCHPPM (2004)	0.0050	Nagy (2001) ^f	0.005	Caulder and Braun (1983)	1.3%	1.4%	0.00007	USEPA (2005)
Mink	<i>Mustela vison</i>	medium semi-aquatic piscivore	1.85 km	Sample and Suter (1994)	1.0	Area specific	0.550	---	Mitchell (1961), as cited in USEPA (1993)			100%		USEPA (1993), Sample and Suter (1994)	0.0238	Nagy (2001) ^e	0.058	Caulder and Braun (1983)	0%	---	0	Sample and Suter (1994)
North American Wolverine	<i>Gulo gulo luscus</i>	medium carnivore (Special Status)	26000 ac	Montana Field Guide (2018)	1.0	Area specific	8.0	---	USFWS (2018)				100%	Lofroth et al. (2007)	0.240	Nagy (2001) ^e	0.643	Caulder and Braun (1983)	2.8%	0.08%	0.007	Beyer et al. (1994) ^l
Short-tailed Shrew	<i>Blarina brevicauda</i>	small terrestrial invertivore	1 ac	Sample and Suter (1994)	1.0	Area specific	0.015	0.00078	Schlessinger and Porter (1974), as cited in Sample and Suter (1994)		100%			Sample and Suter (1994)	0.002	Nagy (2001) ^g	0.002	Caulder and Braun (1983)	1.1%	1.5%	0.00002	USEPA (2005)

Notes:
kg, kilograms
a, ac, acres; km, kilometers
b, Estimated food ingestion rate (kg/day dry weight) for insectivorous birds = (0.54[Body Weight in grams]^{0.705})/1000 (Nagy 2001);
c, Estimated food ingestion rate (kg/day dry weight) for omnivorous birds = (0.670[Body Weight in grams]^{0.627})/1000 (Nagy 2001);
d, Estimated food ingestion rate (kg/day dry weight) for carnivorous birds = (0.849[Body Weight in grams]^{0.663})/1000 (Nagy 2001);
e, Estimated food ingestion rate (kg/day dry weight) for Carnivora = (0.102[Body Weight in grams]^{0.864})/1000 (Nagy 2001);
f, Estimated food ingestion rate (kg/day dry weight) for Rodentia = (0.332[Body Weight in grams]^{0.774})/1000 (Nagy 2001);
g, Estimated food ingestion rate (kg/day dry weight) for insectivorous mammals = (0.373[Body Weight in grams]^{0.622})/1000 (Nagy 2001);
h, Based on assumption from Sample and Suter 1994 that substrate ingestion is negligible for piscivores;
i, Estimated drinking water ingestion rate for birds = (0.059×[body weight in kg]BW^{0.67} (Caulder and Braun, 1983)
j, Estimated drinking water ingestion rate for mammals = (0.099×[body weight in kg]BW^{0.90} (Caulder and Braun, 1983)
k, As cited in the Montana Field Guide, accessed at <http://fieldguide.mt.gov/default.aspx>
l, Based on red fox soil ingestion rate assuming the soil ingestion rate of top predators does not exceed the soil ingestion rate of red fox.
k, Literature-based incidental substrate ingestion rate was not identified; assumed limited incidental ingestion based on habitat preference for fast-moving, clear streams with sand, pebble, or rocky stream bottoms.
l, Incidental soil ingestion rate is assumed to be negligible based primary foraging strategies of gleaning from branches or foliage or catching prey on the wing.

Table H0-3
Estimated Soil to Earthworm Bioaccumulation Factors (BAF) for Non-Ionic Organic Compounds
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	K _{ow} : Octanol to water partitioning coefficient	K _{ww} : worm to soil water partitioning coefficient			K _{oc} : water to soil organic carbon partitioning coefficient ^c				K _d : soil to water partitioning coefficient ^d	Soil to Earthworm BAF ^e
	log K _{ow} ^f	log K _{ww} ^a	K _{ww} wet (L/kg worm ww)	K _{ww} dry (L/kg worm dw) ^b	slope	intercept	log K _{oc}	K _{oc}	K _d (L/kg soil dw)	
Biphenyl (Diphenyl)	3.76	1.27	1.87E+01	1.17E+02	6.79E-01	6.63E-01	3.22E+00	1.64E+03	1.64E+01	7.10E+00
Bis(2-ethylhexyl)phthalate	8.39	5.30	2.00E+05	1.25E+06	6.79E-01	6.63E-01	6.36E+00	2.30E+06	2.30E+04	5.44E+01
Butylbenzylphthalate	4.84	2.21	1.64E+02	1.02E+03	6.79E-01	6.63E-01	3.95E+00	8.96E+03	8.96E+01	1.14E+01
Dibenzofuran	3.71	1.23	1.71E+01	1.07E+02	6.79E-01	6.63E-01	3.19E+00	1.53E+03	1.53E+01	6.96E+00
Di-n-butyl phthalate	4.61	2.01	1.02E+02	6.41E+02	6.79E-01	6.63E-01	3.79E+00	6.21E+03	6.21E+01	1.03E+01
Hexachlorobenzene	5.86	3.10	1.25E+03	7.84E+03	6.79E-01	6.63E-01	4.64E+00	4.38E+04	4.38E+02	1.79E+01
Pentachlorophenol	4.74	2.12	1.32E+02	8.23E+02	6.79E-01	6.63E-01	3.88E+00	7.56E+03	7.56E+01	1.09E+01
1,2,4,5-Tetrachlorobenzene	4.57	1.98	9.48E+01	5.92E+02	6.79E-01	6.63E-01	3.77E+00	5.84E+03	5.84E+01	1.01E+01
2-Chloronaphthalene	3.81	1.32	2.08E+01	1.30E+02	6.79E-01	6.63E-01	3.25E+00	1.79E+03	1.79E+01	7.27E+00
Di-n-butyl phthalate	4.61	2.01	1.02E+02	6.41E+02	6.79E-01	6.63E-01	3.79E+00	6.21E+03	6.21E+01	1.03E+01
Di-n-octyl phthalate	8.54	5.43	2.69E+05	1.68E+06	6.79E-01	6.63E-01	6.46E+00	2.90E+06	2.90E+04	5.81E+01
Hexachlorobutadiene	4.72	2.10	1.27E+02	7.94E+02	6.79E-01	6.63E-01	3.87E+00	7.34E+03	7.34E+01	1.08E+01
Hexachloroethane	4.03	1.51	3.24E+01	2.02E+02	6.79E-01	6.63E-01	3.40E+00	2.53E+03	2.53E+01	8.01E+00
Methylcyclohexane	3.59	1.12	1.33E+01	8.30E+01	6.79E-01	6.63E-01	3.10E+00	1.26E+03	1.26E+01	6.59E+00
PCBs										
Aroclor 1248	6.34	3.52	3.28E+03	2.05E+04	6.79E-01	6.63E-01	4.97E+00	9.29E+04	9.29E+02	2.21E+01
Aroclor 1254	6.98	4.07	1.18E+04	7.39E+04	6.79E-01	6.63E-01	5.40E+00	2.53E+05	2.53E+03	2.92E+01
Dioxin/Furans										
2,3,7,8-TCDD	6.92	4.02	1.05E+04	6.55E+04	6.79E-01	6.63E-01	5.36E+00	2.30E+05	2.30E+03	2.85E+01
1,2,3,7,8-PeCDD	7.56	4.58	3.78E+04	2.36E+05	6.79E-01	6.63E-01	5.80E+00	6.26E+05	6.26E+03	3.77E+01
1,2,3,4,7,8-HxCDD	8.21	5.14	1.39E+05	8.68E+05	6.79E-01	6.63E-01	6.24E+00	1.73E+06	1.73E+04	5.02E+01
1,2,3,6,7,8-HxCDD	8.21	5.14	1.39E+05	8.68E+05	6.79E-01	6.63E-01	6.24E+00	1.73E+06	1.73E+04	5.02E+01
1,2,3,7,8,9-HxCDD	8.21	5.14	1.39E+05	8.68E+05	6.79E-01	6.63E-01	6.24E+00	1.73E+06	1.73E+04	5.02E+01
1,2,3,4,6,7,8-HpCDD	8.85	5.70	5.01E+05	3.13E+06	6.79E-01	6.63E-01	6.67E+00	4.70E+06	4.70E+04	6.66E+01
OCDD	9.50	6.27	1.84E+06	1.15E+07	6.79E-01	6.63E-01	7.11E+00	1.30E+07	1.30E+05	8.86E+01
2,3,7,8-TCDF	6.29	3.47	2.97E+03	1.85E+04	6.79E-01	6.63E-01	4.93E+00	8.59E+04	8.59E+02	2.16E+01
1,2,3,7,8-PeCDF	6.94	4.04	1.09E+04	6.82E+04	6.79E-01	6.63E-01	5.38E+00	2.37E+05	2.37E+03	2.87E+01
2,3,4,7,8-PeCDF	6.94	4.04	1.09E+04	6.82E+04	6.79E-01	6.63E-01	5.38E+00	2.37E+05	2.37E+03	2.87E+01
1,2,3,4,7,8-HxCDF	7.92	4.89	7.77E+04	4.86E+05	6.79E-01	6.63E-01	6.04E+00	1.10E+06	1.10E+04	4.42E+01
1,2,3,6,7,8-HxCDF	7.92	4.89	7.77E+04	4.86E+05	6.79E-01	6.63E-01	6.04E+00	1.10E+06	1.10E+04	4.42E+01
2,3,4,6,7,8-HxCDF	7.92	4.89	7.77E+04	4.86E+05	6.79E-01	6.63E-01	6.04E+00	1.10E+06	1.10E+04	4.42E+01
1,2,3,7,8,9-HxCDF	7.58	4.59	3.93E+04	2.46E+05	6.79E-01	6.63E-01	5.81E+00	6.45E+05	6.45E+03	3.81E+01
1,2,3,4,6,7,8-HpCDF	8.23	5.16	1.45E+05	9.04E+05	6.79E-01	6.63E-01	6.25E+00	1.78E+06	1.78E+04	5.07E+01
1,2,3,4,7,8,9-HpCDF	8.23	5.16	1.45E+05	9.04E+05	6.79E-01	6.63E-01	6.25E+00	1.78E+06	1.78E+04	5.07E+01
OCDF	8.87	5.72	5.21E+05	3.26E+06	6.79E-01	6.63E-01	6.69E+00	4.85E+06	4.85E+04	6.72E+01

Notes:

a, log K_{ww} = 0.87*log K_{ow} - 2 (USEPA, 2007; Jager, 1998)

b, Converted from wet weight to dry weight assuming 16% solids (USEPA, 2005; Jager, 1998)

c, K_{oc} values modeled based on regression equations from Gerstl (1990), for All Compounds: log₁₀K= A*log K_{ow} + B, where A = slope and B = intercept.

d, K_d = f_{oc}*K_{oc}, where "foc" is the fraction of organic carbon in soil.

f_{oc} is assumed to be: 0.01

e, BAF = K_{ww} (L/kg worm dw) / K_d (L/kg soil dw)

Table H0-4
Estimated Soil to Small Mammal Bioaccumulation Factors (BAF) for Non-Ionic Organic Compounds
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Fat content of beef ^c	BAF _{beef ww} ^b	BAF _{plant ww} ^d	BAF _{invert ww} ^e	BAF _{MAX plant/invert ww} ^f	BAF _{soil-mammal dw} ^a
			d/kg beef _{ww}	mg/kg plant _{ww} per mg COPEC/kg soil _{dw}	mg/kg inv _{ww} per mg COPEC/kg soil _{dw}	mg/kg tissue _{ww} per mg COPEC/kg soil _{dw}	mg/kg flesh _{dw} per mg COPEC/kg soil _{dw}
Aroclor 1248	6.34	19%	3.34E-02	2.43E-02	8.61E+00	8.61E+00	2.76E-01
Aroclor 1254	6.98	19%	2.31E-02	1.33E-02	1.14E+01	1.14E+01	2.53E-01
Biphenyl (Diphenyl)	3.76	19%	2.20E-02	2.70E-01	2.77E+00	2.77E+00	5.93E-02
Dibenzofuran	3.71	19%	2.13E-02	2.82E-01	2.71E+00	2.71E+00	5.62E-02
1,2,4,5-Tetrachlorobenzene	4.57	19%	3.48E-02	1.27E-01	3.95E+00	3.95E+00	1.33E-01
2-Chloronaphthalene	3.81	19%	2.29E-02	2.57E-01	2.83E+00	2.83E+00	6.32E-02
Hexachlorobutadiene	4.72	19%	3.66E-02	1.10E-01	4.22E+00	4.22E+00	1.49E-01
Hexachloroethane	4.03	19%	2.66E-02	2.09E-01	3.12E+00	3.12E+00	8.07E-02
Methylcyclohexane	3.59	19%	1.92E-02	3.17E-01	2.57E+00	2.57E+00	4.82E-02

Notes:

a, BAF_{soil-mammal} model based on LANL (2015) equation for Transfer Factor from soil to dry weight flesh (TF_{flesh_dw}):

$$BAF_{soil-mammal} = BAF_{beef} \times \left[\frac{(FIR_{MAX} \times BAF_{MAX plant/invert} + SIR_{MAX})}{(1 - MC)} \right]$$

where:

BAF_{soil-mammal dw} = Soil-to-small mammal BAF (mg/kg flesh_{dw} per mg COPEC/kg soil_{dw})

BAF_{beef ww} = Diet-to-beef transfer factor (d/kg beef_{ww})

FIR_{MAX ww} = Maximum food ingestion rate for LANL prey species (0.305 kg food_{ww}/d; LANL, 2015)

BAF_{MAX Plant/Invert} = Maximum BAF for plant or invertebrate dietary items of the prey species (mg/kg tissue_{ww} per mg COPEC/kg soil_{dw})

SIR_{MAX} = Maximum incidental soil ingestion rate for LANL prey species (0.0193 kg soil_{dw}/d; LANL, 2015)

MC = Moisture content of flesh (assumed 68 percent per LANL, 2015)

b, Diet-to-beef transfer factor calculated based on RTI (2005), consistent with LANL (2017):

$$\text{Log}BAF_{beef ww} = \text{Fat}_{beef} \times (-0.099 \times \log K_{ow}^2 + 1.07 \times \log Kow - 3.56)$$

where:

BAF_{beef ww} = Diet-to-beef transfer factor (d/kg beef_{ww})

Fat_{beef ww} = Fat content of beef; assumed to be 19 percent or 0.19 based on LANL (2017)

K_{ow} = Octanol-water partitioning coefficient

c, Assumed fat content of beef of 19 percent consistent with LANL (2017)

d, BAF_{plant ww}: Soil-to-plant bioaccumulation factor calculated on wet weight basis by multiplying the plant BAF in Table 3 by 1-moisture content of plant leaves (1 - 0.85 = 0.15 per LANL, 2017).

e, BAF_{invert ww}: Soil-to-invertebrate bioaccumulation factor calculated on wet weight basis by multiplying the plant BAF in Table 3 by 1-moisture content in soil invertebrates (1 - 0.61 = 0.39; LANL, 2017).

f, Maximum soil-to-tissue BAF between higher of the BAF_{plant ww} and BAF_{invert ww}

Table H0-5
Avian and Mammalian Toxicity Reference Values
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analytes	Avian Receptors				Mammalian Receptors			
	Chronic TRV _{NOAEL} ^a	Chronic TRV _{LOAEL} ^b	Test Animal	Source	Chronic TRV _{NOAEL} ^a	Chronic TRV _{LOAEL} ^b	Test Animal	Source
	(mg/kg-bw/d)				(mg/kg-bw/d)			
Metals								
Aluminum	110	1100	Ringed dove	Carriere et al. (1986); as cited in LANL EcoRisk	No TRV	No TRV	---	Narrative; USEPA (2003b)
Antimony	No TRV	No TRV	--	--	0.059	2.76	geometric mean	USEPA (2005b); TechLaw (2008)
Arsenic	2.24	4.51	geometric mean	USEPA (2005c); TechLaw (2008)	1.04	4.55	geometric mean	USEPA (2005c); TechLaw (2008)
Barium	73.5	131	geometric mean	LANL (2003)	51.8	82.7	geometric mean	USEPA (2005d); TechLaw (2008)
Beryllium	No TRV	No TRV	--	--	0.532	0.67	geometric mean	USEPA (2005e); TechLaw (2008)
Cadmium	1.47	6.35	geometric Mean	USEPA (2005f); TechLaw (2008)	0.77	6.87	geometric mean	USEPA (2005f); TechLaw (2008)
Chromium	2.66	15.6	geometric mean	USEPA (2008b); TechLaw (2008)	2.4	58.2	geometric mean	USEPA (2008b); TechLaw (2008)
Cobalt	7.61	20.16	geometric mean	USEPA (2005g); TechLaw (2008)	7.33	18.9	geometric mean	USEPA (2005g); TechLaw (2008)
Copper	4.05	34.8	geometric mean	USEPA (2007b); TechLaw (2008)	5.6	82.7	geometric mean	USEPA (2007b); TechLaw (2008)
Lead	1.63	44.6	geometric mean	USEPA (2005h); TechLaw (2008)	4.7	186.4	geometric mean	USEPA (2005h); TechLaw (2008)
Manganese	179	377	geometric mean	USEPA (2007c); TechLaw (2008)	51.5	146	geometric mean	USEPA (2007c); TechLaw (2008)
Mercury	0.45	0.91	Japanese quail	Hill and Schaffer (1976), as cited in Sample et al. (1996)	1.41	14.1	mink	LANL (2017)
Nickel	6.71	18.6	geometric mean	USEPA (2007d); TechLaw (2008)	1.7	14.8	geometric mean	USEPA (2007d); TechLaw (2008)
Selenium	0.3	0.82	geometric mean	USEPA (2007e); TechLaw (2008)	0.143	0.66	geometric mean	USEPA (2007e); TechLaw (2008)
Thallium	0.35	3.5	starling	Schafer (1972), as cited in LANL EcoRisk	0.48	1.43	rat	Engineering Field Activity West (1998)
Vanadium	0.344	1.7	geometric mean	USEPA (2005i) TechLaw (2008)	4.16	9.44	geometric mean	USEPA (2005i) TechLaw (2008)
Zinc	66.1	171	geometric mean	USEPA (2007e); TechLaw (2008)	75.4	298	geometric mean	USEPA (2007e); TechLaw (2008)
Inorganics - Other Inorganics								
Cyanide	0.04	0.4	American kestrel	Wiemeyer et al. (1986), as cited in LANL EcoRisk	68.7	687	rat	Tewe and Manner (1981), as cited in LANL EcoRisk
Fluoride	12.2	122	Eastern screech owl	Pattee et al. (1988), as cited in LANL EcoRisk	26.6	49	mink	Aulerich et al. (1987), as cited in LANL EcoRisk

Table H0-5
Avian and Mammalian Toxicity Reference Values
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analytes	Avian Receptors				Mammalian Receptors			
	Chronic TRV _{NOAEL} ^a	Chronic TRV _{LOAEL} ^b	Test Animal	Source	Chronic TRV _{NOAEL} ^a	Chronic TRV _{LOAEL} ^b	Test Animal	Source
	(mg/kg-bw/d)				(mg/kg-bw/d)			
Polychlorinated Biphenyls								
Aroclor 1248	0.18	1.8	Ring-neck pheasant	Sample et al. (1996)	0.068	0.68	mouse	Sample et al. (1996)
Aroclor 1254	0.18	1.8	Ring-neck pheasant	Sample et al. (1996)	0.068	0.68	mouse	Sample et al. (1996)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Total LMW PAHs	16.1	161	mallard	Patton and Dieter 1980	65.6	356	geometric mean	USEPA (2007g); TechLaw (2008)
Total HMW PAHs	2	20	European starling	USEPA (2007g)	0.615	38.4	geometric mean	USEPA (2007g); TechLaw (2008)
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene	No TRV	No TRV	---	---	No TRV	No TRV	---	---
2,3,4,6-Tetrachlorophenol	No TRV	No TRV	---	---	No TRV	No TRV	---	---
2-Chloronaphthalene	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Biphenyl (Diphenyl)	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Bis(2-ethylhexyl)phthalate	1.1	11	Ringed dove	Sample et al. (1996), as cited in LANL EcoRisk	18.3	183	mouse	Sample et al. (1996), as cited in LANL EcoRisk
Butylbenzylphthalate	0.11	1.1	Ringed dove	Sample et al. (1996)	159	1590	rat	NTP (1985), as cited in LANL EcoRisk
Dibenzofuran	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Di-n-butyl phthalate	0.11	1.1	Ringed dove	Sample et al. (1996)	550	1833	mouse	Sample et al. (1996)
Di-n-octyl phthalate	0.11	1.1	Ringed dove	Sample et al. (1996)	65.1	651	mouse	IT Corporation (1997), as cited in LANL (2017)
Hexachlorobenzene	5	50	Japanese quail	Carpenter et al. (1985), as cited in LANL EcoRisk	7.1	71	Deer mouse	Schafer et al. (1985), as cited in LANL EcoRisk
Hexachlorobutadiene	No TRV	No TRV	---	---	200	2000	Rat	Kociba et al. (1977), as cited in USEPA (1999)
Hexachloroethane	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Pentachlorophenol	6.73	52	geometric mean	USEPA (2007h); TechLaw (2008)	8.42	22.7	geometric mean	USEPA (2007h); TechLaw (2008)

Table H0-5
Avian and Mammalian Toxicity Reference Values
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analytes	Avian Receptors				Mammalian Receptors			
	Chronic TRV _{NOAEL} ^a	Chronic TRV _{LOAEL} ^b	Test Animal	Source	Chronic TRV _{NOAEL} ^a	Chronic TRV _{LOAEL} ^b	Test Animal	Source
	(mg/kg-bw/d)				(mg/kg-bw/d)			
Volatile Organic Compounds (VOCs)								
Methylcyclohexane	No TRV	No TRV	---	---	No TRV	No TRV	---	---
Dioxin/Furans								
Total Dioxins/Furans	0.00000175	0.0000175	chicken	Sample et al (1996); Farmahin et al. (2012) ^e	0.000000562	0.00000376	geometric mean	Murray et al. (1979), as cited in LANL EcoRisk

Notes:

a, NOAEL is no observable adverse effects level.

b, LOAEL is low observable adverse effects level.

c, Aroclor 1254 used as a surrogate for Aroclor 1248 for both birds and mammals.

d, Di-n-butyl phthalate used as a surrogate for avian exposure to phthalates.

e, TRV based on the NOAEL for a ring-necked pheasant, divided by 8 based on the higher sensitivity of AHR1-dependent changes in gene expression of chickens and chicken-like birds, per Farmahin et al. (2012).

-- Appropriate data are not available from published literature to derive NOAEL and LOAEL values.

TechLaw, 2008, Close-out Letter for Calculating Effect-based Ecological Soil Screening Levels for Fort Devens Ayers, MA. Memorandum from Stan Pauwels (TechLaw) to Bart Hoskins (EPA Region I) dated November 18, 2008. TDF No. 1216, Task Order No. 26, Task No. 01.

United States Environmental Protection Agency (USEPA), 1999, Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA530-D-99-001A, August.



Appendix H1 Screening Level Food Chain Models

Table H1-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0-0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	6.10E-01	Regression ^a	2.48E-02	USEPA (2007)	1.00E+00	6.10E-01	Assumption ^c	5.00E-02	3.05E-02	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	7.60E+00	3.75E-02	2.85E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.01E+00	Sample et al. (1999)	Regression ^f	4.13E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	0.00E+00	1.56E-01	0.00E+00	Bechtel-Jacobs (1998a) ^g	9.10E-02	0.00E+00	Sample et al. (1998a)	6.83E-04	0.00E+00	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	1.70E+00	Regression ^a	8.31E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.26E+01	Sample et al. (1999)	Regression ^f	3.66E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	8.08E+01	4.10E-02	3.31E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	2.47E+01	Sample et al. (1998a)	Regression ^f	5.83E+00	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	3.45E+01	Regression ^a	7.87E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.78E+01	Sample et al. (1998a)	Regression ^f	1.28E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	5.77E+01	Regression ^a	2.58E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.12E+01	Sample et al. (1999)	Regression ^f	6.48E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ^j
Mercury	NA	2.60E-04	6.90E-02	Regression ^a	8.63E-02	Bechtel-Jacobs (1998a)	3.93E+00	2.71E-01	Sample et al. (1998a)	3.81E-01	2.63E-02	LANL (2015)
Nickel	NA	5.59E-02	1.40E+02	Regression ^a	4.36E+00	Bechtel-Jacobs (1998a)	7.78E-01	1.09E+02	Sample et al. (1998a)	Regression ^f	7.81E+00	Sample et al. (1998b)
Selenium	NA	0.00E+00	6.60E-01	Regression ^a	3.21E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.84E-01	Sample et al. (1998a)	Regression ^f	5.64E-01	Sample et al. (1998b)
Silver		1.50E-03	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	3.16E+01	4.85E-03	1.53E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	1.33E+00	Sample et al. (1998a)	1.23E-02	3.89E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	1.51E+02	Regression ^a	7.78E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.43E+02	Sample et al. (1998a)	Regression ^f	1.12E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	9.90E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	5.71E+02	6.00E-02	3.43E+01	Baes et al. (1984)	1.24E-01	7.08E+01	USCHPPM (2004)	1.60E-02	9.14E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	0.00E+00	8.90E-02	0.00E+00	USEPA (2007a)	2.92E+01	0.00E+00	USEPA (2007a)	2.53E-01	0.00E+00	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:		0.00E+00										
Acenaphthene	3.92	0.00E+00	1.50E+01	Regression ^a	3.79E-04	USEPA (2007a)	1.47E+00	2.21E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	2.20E+01	Regression ^a	4.13E+00	USEPA (2007a)	2.42E+00	5.32E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	1.70E+02	5.00E-01	8.50E+01	USEPA (2007a)	3.04E+00	5.17E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	1.00E+01	Regression ^a	5.36E-04	USEPA (2007a)	9.57E+00	9.57E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	4.00E+00	1.22E+01	4.88E+01	USEPA (2007a)	4.40E+00	1.76E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	1.20E+02	Regression ^a	1.65E+01	USEPA (2007a)	1.72E+00	2.06E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												

Table H1-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0-0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:		0.00E+00										
Benzo(a)anthracene	5.7	3.00E-03	1.10E+02	Regression ^a	1.09E+00	USEPA (2007a)	1.59E+00	1.75E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	1.30E+02	Regression ^a	1.46E+01	USEPA (2007a)	1.33E+00	1.73E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	1.50E+02	3.10E-01	4.65E+01	USEPA (2007a)	2.60E+00	3.90E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	9.90E+01	Regression ^a	9.04E+01	USEPA (2007a)	2.94E+00	2.91E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	1.30E+02	Regression ^a	1.20E+00	USEPA (2007a)	2.29E+00	2.98E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	2.80E+01	1.30E-01	3.64E+00	USEPA (2007a)	2.31E+00	6.47E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	1.00E+02	1.10E-01	1.10E+01	USEPA (2007a)	2.86E+00	2.86E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	2.20E+02	7.20E-01	1.58E+02	USEPA (2007a)	1.75E+00	3.85E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	5.80E+00	2.38E-02	1.38E-01	USEPA (2007a)	5.44E+01	3.16E+02	USEPA (2007a)	7.79E-01	4.52E+00	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	8.50E-02	8.14E-01	6.92E-02	USEPA (2007a)	1.03E+01	8.77E-01	USEPA (2007a)	4.49E-01	3.82E-02	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	2.53E-01	0.00E+00	USEPA (2007a)	1.79E+01	0.00E+00	USEPA (2007a)	2.65E+00	0.00E+00	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	0.00E+00	5.93E+00	0.00E+00	USEPA (2007a)	1.09E+01	0.00E+00	USEPA (2007a)	Regression ^g	0.00E+00	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)

Table H1-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0-0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	5.80E-07	9.41E-02	5.46E-08	USEPA (2007a) ^b	Regression ^d	1.45E-06	Sample et al. (1998a)	Regression ^h	3.14E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	1.53E-06	5.17E-02	7.92E-08	USEPA (2007a) ^b	Regression ^d	4.58E-06	Sample et al. (1998a)	Regression ^h	9.11E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	4.07E-06	2.82E-02	1.15E-07	USEPA (2007a) ^b	Regression ^d	1.46E-05	Sample et al. (1998a)	Regression ^h	2.67E-06	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	1.92E-05	2.82E-02	5.41E-07	USEPA (2007a) ^b	Regression ^d	9.10E-05	Sample et al. (1998a)	Regression ^h	1.47E-05	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	9.54E-06	2.82E-02	2.69E-07	USEPA (2007a) ^b	Regression ^d	3.98E-05	Sample et al. (1998a)	Regression ^h	6.81E-06	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	6.04E-04	1.55E-02	9.37E-06	USEPA (2007a) ^b	Regression ^d	5.36E-03	Sample et al. (1998a)	Regression ^h	6.51E-04	Sample et al. (1998b)
OCDD	9.50	0.00E+00	6.76E-03	8.45E-03	5.71E-05	USEPA (2007a) ^b	Regression ^d	9.32E-02	Sample et al. (1998a)	Regression ^h	9.26E-03	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	6.15E-06	1.69E-01	1.04E-06	USEPA (2007a) ^b	Regression ^d	2.37E-05	Sample et al. (1998a)	1.25E-01	7.69E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	2.84E-06	9.24E-02	2.62E-07	USEPA (2007a) ^b	Regression ^d	9.51E-06	Sample et al. (1998a)	1.25E-01	3.55E-07	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	3.65E-06	9.24E-02	3.37E-07	USEPA (2007a) ^b	Regression ^d	1.28E-05	Sample et al. (1998a)	1.25E-01	4.57E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	5.47E-06	3.70E-02	2.02E-07	USEPA (2007a) ^b	Regression ^d	2.06E-05	Sample et al. (1998a)	1.25E-01	6.84E-07	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	4.00E-06	3.70E-02	1.48E-07	USEPA (2007a) ^b	Regression ^d	1.43E-05	Sample et al. (1998a)	1.25E-01	5.00E-07	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	0.00E+00	3.70E-02	0.00E+00	USEPA (2007a) ^b	Regression ^d	0.00E+00	Sample et al. (1998a)	1.25E-01	0.00E+00	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	2.58E-06	5.08E-02	1.31E-07	USEPA (2007a) ^b	Regression ^d	8.49E-06	Sample et al. (1998a)	1.25E-01	3.23E-07	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	6.97E-05	2.77E-02	1.93E-06	USEPA (2007a) ^b	Regression ^d	4.18E-04	Sample et al. (1998a)	1.25E-01	8.72E-06	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	4.13E-06	2.77E-02	1.14E-07	USEPA (2007a) ^b	Regression ^d	1.48E-05	Sample et al. (1998a)	1.25E-01	5.17E-07	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	1.90E-04	1.52E-02	2.89E-06	USEPA (2007a) ^b	Regression ^d	1.37E-03	Sample et al. (1998a)	1.25E-01	2.38E-05	Sample et al. (1998b) ⁱ

Table H1-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors -Main Plant Area (0-0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	0.544	-0.996	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H1-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	4.20E-01	Regression ^a	1.75E-02	USEPA (2007)	1.00E+00	4.20E-01	Assumption ^c	5.00E-02	2.10E-02	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	8.10E+00	3.75E-02	3.04E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.06E+00	Sample et al. (1999)	Regression ^f	4.35E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	0.00E+00	1.56E-01	0.00E+00	Bechtel-Jacobs (1998a) ^g	9.10E-02	0.00E+00	Sample et al. (1998a)	6.83E-04	0.00E+00	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	8.75E-01	Regression ^a	5.78E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.45E+00	Sample et al. (1999)	Regression ^f	2.67E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	3.53E+01	4.10E-02	1.45E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	1.08E+01	Sample et al. (1998a)	Regression ^f	3.17E+00	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	4.51E+01	Regression ^a	8.75E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.32E+01	Sample et al. (1998a)	Regression ^f	1.34E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	3.82E+01	Regression ^a	2.04E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.52E+01	Sample et al. (1999)	Regression ^f	5.40E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ^j
Mercury	NA	2.60E-04	2.20E-01	Regression ^a	1.62E-01	Bechtel-Jacobs (1998a)	3.93E+00	8.64E-01	Sample et al. (1998a)	3.81E-01	8.37E-02	LANL (2015)
Nickel	NA	5.59E-02	9.27E+01	Regression ^a	3.21E+00	Bechtel-Jacobs (1998a)	7.78E-01	7.21E+01	Sample et al. (1998a)	Regression ^f	6.45E+00	Sample et al. (1998b)
Selenium	NA	0.00E+00	5.70E-01	Regression ^a	2.73E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.14E-01	Sample et al. (1998a)	Regression ^f	5.34E-01	Sample et al. (1998b)
Silver		1.50E-03	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	2.88E+01	4.85E-03	1.40E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	1.21E+00	Sample et al. (1998a)	1.23E-02	3.54E-01	Sample et al. (1998b) ^j
Zinc	NA	5.37E-01	2.04E+02	Regression ^a	9.20E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.90E+02	Sample et al. (1998a)	Regression ^f	1.14E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	2.40E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	4.18E+02	6.00E-02	2.51E+01	Baes et al. (1984)	1.24E-01	5.18E+01	USCHPPM (2004)	1.60E-02	6.69E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	0.00E+00	8.90E-02	0.00E+00	USEPA (2007a)	2.92E+01	0.00E+00	USEPA (2007a)	2.53E-01	0.00E+00	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:		0.00E+00										
Acenaphthene	3.92	0.00E+00	5.70E+00	Regression ^a	8.66E-04	USEPA (2007a)	1.47E+00	8.38E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	8.95E+00	Regression ^a	2.05E+00	USEPA (2007a)	2.42E+00	2.17E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	8.40E+01	5.00E-01	4.20E+01	USEPA (2007a)	3.04E+00	2.55E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	4.00E+00	Regression ^a	1.17E-03	USEPA (2007a)	9.57E+00	3.83E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	2.43E+00	1.22E+01	2.96E+01	USEPA (2007a)	4.40E+00	1.07E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	5.03E+01	Regression ^a	9.61E+00	USEPA (2007a)	1.72E+00	8.64E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:		0.00E+00										
Benzo(a)anthracene	5.7	3.00E-03	4.18E+01	Regression ^a	6.13E-01	USEPA (2007a)	1.59E+00	6.64E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	5.05E+01	Regression ^a	5.83E+00	USEPA (2007a)	1.33E+00	6.72E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	5.70E+01	3.10E-01	1.77E+01	USEPA (2007a)	2.60E+00	1.48E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	4.20E+01	Regression ^a	3.28E+01	USEPA (2007a)	2.94E+00	1.23E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	5.18E+01	Regression ^a	6.96E-01	USEPA (2007a)	2.29E+00	1.19E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	1.00E+01	1.30E-01	1.30E+00	USEPA (2007a)	2.31E+00	2.31E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
to (1,2,3-CD) Pyrene	6.58	3.10E-03	4.38E+01	1.10E-01	4.81E+00	USEPA (2007a)	2.86E+00	1.25E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H1-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Pyrene	4.88	7.00E-03	8.43E+01	7.20E-01	6.07E+01	USEPA (2007a)	1.75E+00	1.47E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	1.56E+00	2.38E-02	3.70E-02	USEPA (2007a)	5.44E+01	8.46E+01	USEPA (2007a)	7.79E-01	1.21E+00	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	1.63E-01	8.14E-01	1.32E-01	USEPA (2007a)	1.03E+01	1.68E+00	USEPA (2007a)	4.49E-01	7.30E-02	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	2.53E-01	0.00E+00	USEPA (2007a)	1.79E+01	0.00E+00	USEPA (2007a)	2.65E+00	0.00E+00	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	0.00E+00	5.93E+00	0.00E+00	USEPA (2007a)	1.09E+01	0.00E+00	USEPA (2007a)	Regression ^g	0.00E+00	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	1.58E-07	9.41E-02	1.49E-08	USEPA (2007a) ^b	Regression ^d	3.13E-07	Sample et al. (1998a)	Regression ^h	7.51E-08	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	9.30E-07	5.17E-02	4.81E-08	USEPA (2007a) ^b	Regression ^d	2.54E-06	Sample et al. (1998a)	Regression ^h	5.27E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	2.40E-06	2.82E-02	6.77E-08	USEPA (2007a) ^b	Regression ^d	7.79E-06	Sample et al. (1998a)	Regression ^h	1.49E-06	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	1.07E-05	2.82E-02	3.02E-07	USEPA (2007a) ^b	Regression ^d	4.56E-05	Sample et al. (1998a)	Regression ^h	7.73E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	5.99E-06	2.82E-02	1.69E-07	USEPA (2007a) ^b	Regression ^d	2.30E-05	Sample et al. (1998a)	Regression ^h	4.08E-06	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	3.36E-04	1.55E-02	5.21E-06	USEPA (2007a) ^b	Regression ^d	2.68E-03	Sample et al. (1998a)	Regression ^h	3.42E-04	Sample et al. (1998b)
OCDD	9.50	0.00E+00	3.83E-03	8.45E-03	3.23E-05	USEPA (2007a) ^b	Regression ^d	4.76E-02	Sample et al. (1998a)	Regression ^h	4.96E-03	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	2.69E-06	1.69E-01	4.56E-07	USEPA (2007a) ^b	Regression ^d	8.92E-06	Sample et al. (1998a)	1.25E-01	3.37E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	1.58E-06	9.24E-02	1.46E-07	USEPA (2007a) ^b	Regression ^d	4.76E-06	Sample et al. (1998a)	1.25E-01	1.98E-07	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	1.92E-06	9.24E-02	1.77E-07	USEPA (2007a) ^b	Regression ^d	5.99E-06	Sample et al. (1998a)	1.25E-01	2.40E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	7.23E-06	3.70E-02	2.67E-07	USEPA (2007a) ^b	Regression ^d	2.87E-05	Sample et al. (1998a)	1.25E-01	9.04E-07	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	2.16E-06	3.70E-02	7.99E-08	USEPA (2007a) ^b	Regression ^d	6.88E-06	Sample et al. (1998a)	1.25E-01	2.70E-07	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	1.05E-07	3.70E-02	3.88E-09	USEPA (2007a) ^b	Regression ^d	1.93E-07	Sample et al. (1998a)	1.25E-01	1.31E-08	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	3.44E-06	5.08E-02	1.75E-07	USEPA (2007a) ^b	Regression ^d	1.19E-05	Sample et al. (1998a)	1.25E-01	4.30E-07	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	4.98E-05	2.77E-02	1.38E-06	USEPA (2007a) ^b	Regression ^d	2.81E-04	Sample et al. (1998a)	1.25E-01	6.23E-06	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	2.62E-06	2.77E-02	7.25E-08	USEPA (2007a) ^b	Regression ^d	8.65E-06	Sample et al. (1998a)	1.25E-01	3.28E-07	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	1.24E-04	1.52E-02	1.89E-06	USEPA (2007a) ^b	Regression ^d	8.26E-04	Sample et al. (1998a)	1.25E-01	1.55E-05	Sample et al. (1998b) ⁱ

Table H1-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	0.544	-0.996	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H1-2
Screening-Level Exposure Evaluation - American Woodcock
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	6.10E-01	7.70E-03	2.91E-04	6.45E-02	0.00E+00	6.48E-02	9.05E-04	5.37E-03	7.11E-02	No TRV	--	No TRV	--
Arsenic	7.60E+00	4.40E-03	3.35E-03	1.07E-01	0.00E+00	1.10E-01	5.17E-04	6.70E-02	1.78E-01	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.18E-01	0.00E+00	3.18E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04	No TRV	--	No TRV	--
Cadmium	1.70E+00	3.00E-03	9.76E-03	1.34E+00	0.00E+00	1.34E+00	3.52E-04	1.50E-02	1.36E+00	1.47E+00	<1	6.35E+00	<1
Chromium	8.08E+01	2.72E-02	3.89E-02	2.61E+00	0.00E+00	2.65E+00	3.20E-03	7.12E-01	3.37E+00	2.66E+00	1.27E+00	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-03	0.00E+00	1.82E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.45E+01	1.83E-01	9.25E-02	1.88E+00	0.00E+00	1.97E+00	2.15E-02	3.04E-01	2.30E+00	4.05E+00	<1	3.48E+01	<1
Lead	5.77E+01	3.52E-02	3.03E-02	2.24E+00	0.00E+00	2.27E+00	4.14E-03	5.08E-01	2.79E+00	1.63E+00	1.71E+00	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-01	0.00E+00	4.41E-01	1.79E+02	<1	3.77E+02	<1
Mercury	6.90E-02	2.60E-04	1.01E-03	2.87E-02	0.00E+00	2.97E-02	3.05E-05	6.08E-04	3.03E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.40E+02	5.59E-02	5.13E-02	1.15E+01	0.00E+00	1.16E+01	6.57E-03	1.23E+00	1.28E+01	6.71E+00	1.91E+00	1.86E+01	<1
Selenium	6.60E-01	0.00E+00	3.77E-03	7.23E-02	0.00E+00	7.61E-02	0.00E+00	5.82E-03	8.19E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-05	0.00E+00	3.88E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	3.16E+01	2.48E-02	1.80E-03	1.40E-01	0.00E+00	1.42E-01	2.91E-03	2.78E-01	4.23E-01	3.44E-01	1.23E+00	1.70E+00	<1
Zinc	1.51E+02	5.37E-01	9.14E-01	4.69E+01	0.00E+00	4.78E+01	6.31E-02	1.33E+00	4.92E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	8.72E-03	5.31E-02	4.00E-02	1.33E+00	4.00E-01	<1
Fluoride	5.71E+02	2.24E+01	4.02E-01	7.49E+00	0.00E+00	7.89E+00	2.63E+00	5.03E+00	1.56E+01	1.22E+01	1.27E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.50E+01	0.00E+00	4.45E-06	2.33E+00	0.00E+00	2.33E+00	0.00E+00	1.32E-01	2.46E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.20E+01	6.20E-04	4.85E-02	5.63E+00	0.00E+00	5.68E+00	7.28E-05	1.94E-01	5.87E+00				
Fluoranthene	1.70E+02	9.30E-03	9.99E-01	5.46E+01	0.00E+00	5.56E+01	1.09E-03	1.50E+00	5.71E+01				
Fluorene	1.00E+01	8.70E-04	6.29E-06	1.01E+01	0.00E+00	1.01E+01	1.02E-04	8.81E-02	1.02E+01				
Naphthalene	4.00E+00	8.70E-04	5.73E-01	1.86E+00	0.00E+00	2.43E+00	1.02E-04	3.52E-02	2.47E+00				
Phenanthrene	1.20E+02	1.50E-03	1.94E-01	2.18E+01	0.00E+00	2.20E+01	1.76E-04	1.06E+00	2.31E+01				
Total LMW PAHs						9.82E+01	1.55E-03	3.00E+00	1.01E+02	1.61E+01	6.29E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.10E+02	3.00E-03	1.28E-02	1.85E+01	0.00E+00	1.85E+01	3.52E-04	9.69E-01	1.95E+01				
Benzo(A)Pyrene	1.30E+02	0.00E+00	1.72E-01	1.83E+01	0.00E+00	1.85E+01	0.00E+00	1.15E+00	1.96E+01				
Benzo(b)fluoranthene	1.50E+02	1.00E-02	5.46E-01	4.12E+01	0.00E+00	4.18E+01	1.17E-03	1.32E+00	4.31E+01				
Benzo(g,h,i)perylene	9.90E+01	3.90E-03	1.06E+00	3.08E+01	0.00E+00	3.18E+01	4.58E-04	8.72E-01	3.27E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	1.30E+02	7.60E-03	1.41E-02	3.15E+01	0.00E+00	3.15E+01	8.93E-04	1.15E+00	3.26E+01				
Dibenz(A,H)Anthracene	2.80E+01	9.80E-05	4.28E-02	6.84E+00	0.00E+00	6.88E+00	1.15E-05	2.47E-01	7.13E+00				
Indeno (1,2,3-CD) Pyrene	1.00E+02	3.10E-03	1.29E-01	3.02E+01	0.00E+00	3.04E+01	3.64E-04	8.81E-01	3.13E+01				
Pyrene	2.20E+02	7.00E-03	1.86E+00	4.07E+01	0.00E+00	4.26E+01	8.22E-04	1.94E+00	4.45E+01				
Total HMW PAHs						2.22E+02	4.13E-03	8.52E+00	2.30E+02	2.00E+00	1.15E+02	2.00E+01	1.15E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.80E+00	2.20E-02	1.62E-03	3.34E+01	0.00E+00	3.34E+01	2.58E-03	5.11E-02	3.34E+01	1.10E+00	3.04E+01	1.10E+01	3.04E+00
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.50E-02	0.00E+00	8.13E-04	9.27E-02	0.00E+00	9.35E-02	0.00E+00	7.49E-04	9.42E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H1-2
Screening-Level Exposure Evaluation - American Woodcock
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	5.80E-07	0.00E+00	6.41E-10	1.54E-07	0.00E+00	1.54E-07	0.00E+00	5.11E-09	1.60E-07				
1,2,3,7,8-PeCDD	1.53E-06	0.00E+00	9.30E-10	4.84E-07	0.00E+00	4.85E-07	0.00E+00	1.35E-08	4.98E-07				
1,2,3,4,7,8-HxCDD	4.07E-06	0.00E+00	1.35E-09	1.54E-06	0.00E+00	7.70E-08	0.00E+00	1.79E-09	7.88E-08				
1,2,3,6,7,8-HxCDD	1.92E-05	0.00E+00	6.36E-09	9.63E-06	0.00E+00	9.63E-08	0.00E+00	1.69E-09	9.80E-08				
1,2,3,7,8,9-HxCDD	9.54E-06	0.00E+00	3.16E-09	4.21E-06	0.00E+00	4.21E-07	0.00E+00	8.41E-09	4.30E-07				
1,2,3,4,6,7,8-HpCDD	6.04E-04	0.00E+00	1.10E-07	5.67E-04	0.00E+00	5.67E-07	0.00E+00	5.32E-09	5.73E-07				
OCDD	6.76E-03	0.00E+00	6.71E-07	9.85E-03	0.00E+00	9.85E-07	0.00E+00	5.96E-09	9.91E-07				
2,3,7,8-TCDF	6.15E-06	0.00E+00	1.22E-08	2.51E-06	0.00E+00	2.52E-06	0.00E+00	5.42E-08	2.57E-06				
1,2,3,7,8-PeCDF	2.84E-06	0.00E+00	3.08E-09	1.01E-06	0.00E+00	1.01E-07	0.00E+00	2.50E-09	1.03E-07				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	3.96E-09	1.35E-06	0.00E+00	1.36E-06	0.00E+00	3.22E-08	1.39E-06				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	2.38E-09	2.18E-06	0.00E+00	2.18E-07	0.00E+00	4.82E-09	2.23E-07				
1,2,3,6,7,8-HxCDF	4.00E-06	0.00E+00	1.74E-09	1.51E-06	0.00E+00	1.51E-07	0.00E+00	3.52E-09	1.54E-07				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	1.54E-09	8.98E-07	0.00E+00	8.99E-08	0.00E+00	2.27E-09	9.22E-08				
1,2,3,4,6,7,8-HpCDF	6.97E-05	0.00E+00	2.27E-08	4.42E-05	0.00E+00	4.42E-07	0.00E+00	6.14E-09	4.48E-07				
1,2,3,4,7,8,9-HpCDF	4.13E-06	0.00E+00	1.34E-09	1.57E-06	0.00E+00	1.57E-08	0.00E+00	3.64E-10	1.60E-08				
OCDF	1.90E-04	0.00E+00	3.40E-08	1.45E-04	0.00E+00	1.45E-08	0.00E+00	1.67E-10	1.46E-08				
Total Dioxins/Furans						7.69E-06	0.00E+00	1.48E-07	7.84E-06	1.75E-06	4.48E+00	1.75E-05	<1

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:	ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
	IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
	B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
	C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
	DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
	AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
	BW	= Body weight of the receptor, wet weight (kg)
	ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
	IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
	C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-3
Screening-Level Exposure Evaluation - Mourning Dove
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	6.10E-01	7.70E-03	2.83E-03	0.00E+00	0.00E+00	2.83E-03	8.79E-04	4.73E-03	8.44E-03	No TRV	--	No TRV	--
Arsenic	7.60E+00	4.40E-03	3.25E-02	0.00E+00	0.00E+00	3.25E-02	5.02E-04	5.90E-02	9.20E-02	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-01	0.00E+00	3.09E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04	No TRV	--	No TRV	--
Cadmium	1.70E+00	3.00E-03	9.48E-02	0.00E+00	0.00E+00	9.48E-02	3.42E-04	1.32E-02	1.08E-01	1.47E+00	<1	6.35E+00	<1
Chromium	8.08E+01	2.72E-02	3.78E-01	0.00E+00	0.00E+00	3.78E-01	3.10E-03	6.27E-01	1.01E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	0.00E+00	1.77E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.45E+01	1.83E-01	8.98E-01	0.00E+00	0.00E+00	8.98E-01	2.09E-02	2.68E-01	1.19E+00	4.05E+00	<1	3.48E+01	<1
Lead	5.77E+01	3.52E-02	2.94E-01	0.00E+00	0.00E+00	2.94E-01	4.02E-03	4.48E-01	7.46E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.28E-01	0.00E+00	4.28E-01	1.79E+02	<1	3.77E+02	<1
Mercury	6.90E-02	2.60E-04	9.84E-03	0.00E+00	0.00E+00	9.84E-03	2.97E-05	5.36E-04	1.04E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.40E+02	5.59E-02	4.98E-01	0.00E+00	0.00E+00	4.98E-01	6.38E-03	1.09E+00	1.59E+00	6.71E+00	<1	1.86E+01	<1
Selenium	6.60E-01	0.00E+00	3.67E-02	0.00E+00	0.00E+00	3.67E-02	0.00E+00	5.12E-03	4.18E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-05	0.00E+00	3.77E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	3.16E+01	2.48E-02	1.75E-02	0.00E+00	0.00E+00	1.75E-02	2.83E-03	2.45E-01	2.66E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.51E+02	5.37E-01	8.88E+00	0.00E+00	0.00E+00	8.88E+00	6.13E-02	1.17E+00	1.01E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	7.68E-03	5.08E-02	4.00E-02	1.27E+00	4.00E-01	<1
Fluoride	5.71E+02	2.24E+01	3.91E+00	0.00E+00	0.00E+00	3.91E+00	2.56E+00	4.43E+00	1.09E+01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.50E+01	0.00E+00	4.32E-05	0.00E+00	0.00E+00	4.32E-05	0.00E+00	1.16E-01	1.16E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.20E+01	6.20E-04	4.71E-01	0.00E+00	0.00E+00	4.71E-01	7.08E-05	1.71E-01	6.42E-01				
Fluoranthene	1.70E+02	9.30E-03	9.70E+00	0.00E+00	0.00E+00	9.70E+00	1.06E-03	1.32E+00	1.10E+01				
Fluorene	1.00E+01	8.70E-04	6.11E-05	0.00E+00	0.00E+00	6.11E-05	9.93E-05	7.76E-02	7.78E-02				
Naphthalene	4.00E+00	8.70E-04	5.57E+00	0.00E+00	0.00E+00	5.57E+00	9.93E-05	3.10E-02	5.60E+00				
Phenanthrene	1.20E+02	1.50E-03	1.88E+00	0.00E+00	0.00E+00	1.88E+00	1.71E-04	9.31E-01	2.81E+00				
Total LMW PAHs						1.76E+01	1.50E-03	2.65E+00	2.03E+01	1.61E+01	1.26E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.10E+02	3.00E-03	1.24E-01	0.00E+00	0.00E+00	1.24E-01	3.42E-04	8.54E-01	9.79E-01				
Benzo[A]Pyrene	1.30E+02	0.00E+00	1.67E+00	0.00E+00	0.00E+00	1.67E+00	0.00E+00	1.01E+00	2.68E+00				
Benzo(b)fluoranthene	1.50E+02	1.00E-02	5.31E+00	0.00E+00	0.00E+00	5.31E+00	1.14E-03	1.16E+00	6.47E+00				
Benzo(g,h,i)perylene	9.90E+01	3.90E-03	1.03E+01	0.00E+00	0.00E+00	1.03E+01	4.45E-04	7.68E-01	1.11E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	1.30E+02	7.60E-03	1.37E-01	0.00E+00	0.00E+00	1.37E-01	8.67E-04	1.01E+00	1.15E+00				
Dibenz(A,H)Anthracene	2.80E+01	9.80E-05	4.15E-01	0.00E+00	0.00E+00	4.15E-01	1.12E-05	2.17E-01	6.33E-01				
Indeno (1,2,3-CD) Pyrene	1.00E+02	3.10E-03	1.26E+00	0.00E+00	0.00E+00	1.26E+00	3.54E-04	7.76E-01	2.03E+00				
Pyrene	2.20E+02	7.00E-03	1.81E+01	0.00E+00	0.00E+00	1.81E+01	7.99E-04	1.71E+00	1.98E+01				
Total HMW PAHs						3.73E+01	4.01E-03	7.51E+00	4.48E+01	2.00E+00	2.24E+01	2.00E+01	2.24E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.80E+00	2.20E-02	1.58E-02	0.00E+00	0.00E+00	1.58E-02	2.51E-03	4.50E-02	6.33E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.50E-02	0.00E+00	7.90E-03	0.00E+00	0.00E+00	7.90E-03	0.00E+00	6.60E-04	8.56E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H1-3
Screening-Level Exposure Evaluation - Mourning Dove
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	5.80E-07	0.00E+00	6.23E-09	0.00E+00	0.00E+00	6.23E-09	0.00E+00	4.50E-09	1.07E-08				
1,2,3,7,8-PeCDD	1.53E-06	0.00E+00	9.04E-09	0.00E+00	0.00E+00	9.04E-09	0.00E+00	1.19E-08	2.09E-08				
1,2,3,4,7,8-HxCDD	4.07E-06	0.00E+00	1.31E-08	0.00E+00	0.00E+00	6.55E-10	0.00E+00	1.58E-09	2.23E-09				
1,2,3,6,7,8-HxCDD	1.92E-05	0.00E+00	6.18E-08	0.00E+00	0.00E+00	6.18E-10	0.00E+00	1.49E-09	2.11E-09				
1,2,3,7,8,9-HxCDD	9.54E-06	0.00E+00	3.07E-08	0.00E+00	0.00E+00	3.07E-09	0.00E+00	7.40E-09	1.05E-08				
1,2,3,4,6,7,8-HpCDD	6.04E-04	0.00E+00	1.07E-06	0.00E+00	0.00E+00	1.07E-09	0.00E+00	4.69E-09	5.76E-09				
OCDD	6.76E-03	0.00E+00	6.52E-06	0.00E+00	0.00E+00	6.52E-10	0.00E+00	5.25E-09	5.90E-09				
2,3,7,8-TCDF	6.15E-06	0.00E+00	1.19E-07	0.00E+00	0.00E+00	1.19E-07	0.00E+00	4.77E-08	1.67E-07				
1,2,3,7,8-PeCDF	2.84E-06	0.00E+00	2.99E-08	0.00E+00	0.00E+00	2.99E-09	0.00E+00	2.20E-09	5.20E-09				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	3.85E-08	0.00E+00	0.00E+00	3.85E-08	0.00E+00	2.83E-08	6.68E-08				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	2.31E-08	0.00E+00	0.00E+00	2.31E-09	0.00E+00	4.25E-09	6.55E-09				
1,2,3,6,7,8-HxCDF	4.00E-06	0.00E+00	1.69E-08	0.00E+00	0.00E+00	1.69E-09	0.00E+00	3.10E-09	4.79E-09				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	1.50E-08	0.00E+00	0.00E+00	1.50E-09	0.00E+00	2.00E-09	3.50E-09				
1,2,3,4,6,7,8-HpCDF	6.97E-05	0.00E+00	2.20E-07	0.00E+00	0.00E+00	2.20E-09	0.00E+00	5.41E-09	7.61E-09				
1,2,3,4,7,8,9-HpCDF	4.13E-06	0.00E+00	1.30E-08	0.00E+00	0.00E+00	1.30E-10	0.00E+00	3.21E-10	4.51E-10				
OCDF	1.90E-04	0.00E+00	3.30E-07	0.00E+00	0.00E+00	3.30E-11	0.00E+00	1.47E-10	1.80E-10				
Total Dioxins/Furans						1.90E-07	0.00E+00	1.30E-07	3.20E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	6.10E-01	7.70E-03	0.00E+00	0.00E+00	2.50E-03	2.50E-03	6.31E-04	1.30E-03	4.43E-03	No TRV	--	No TRV	--
Arsenic	7.60E+00	4.40E-03	0.00E+00	0.00E+00	3.39E-03	3.39E-03	3.61E-04	1.62E-02	2.00E-02	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-01	0.00E+00	2.22E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04	No TRV	--	No TRV	--
Cadmium	1.70E+00	3.00E-03	0.00E+00	0.00E+00	3.00E-02	3.00E-02	2.46E-04	3.62E-03	3.38E-02	1.47E+00	<1	6.35E+00	<1
Chromium	8.08E+01	2.72E-02	0.00E+00	0.00E+00	4.78E-01	4.78E-01	2.23E-03	1.72E-01	6.53E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	0.00E+00	1.27E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.45E+01	1.83E-01	0.00E+00	0.00E+00	1.05E+00	1.05E+00	1.50E-02	7.36E-02	1.14E+00	4.05E+00	<1	3.48E+01	<1
Lead	5.77E+01	3.52E-02	0.00E+00	0.00E+00	5.32E-01	5.32E-01	2.89E-03	1.23E-01	6.58E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-01	0.00E+00	3.08E-01	1.79E+02	<1	3.77E+02	<1
Mercury	6.90E-02	2.60E-04	0.00E+00	0.00E+00	2.16E-03	2.16E-03	2.13E-05	1.47E-04	2.32E-03	4.50E-01	<1	9.10E-01	<1
Nickel	1.40E+02	5.59E-02	0.00E+00	0.00E+00	6.41E-01	6.41E-01	4.58E-03	2.99E-01	9.44E-01	6.71E+00	<1	1.86E+01	<1
Selenium	6.60E-01	0.00E+00	0.00E+00	0.00E+00	4.63E-02	4.63E-02	0.00E+00	1.41E-03	4.77E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-05	0.00E+00	2.71E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	3.16E+01	2.48E-02	0.00E+00	0.00E+00	3.19E-02	3.19E-02	2.03E-03	6.74E-02	1.01E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.51E+02	5.37E-01	0.00E+00	0.00E+00	9.18E+00	9.18E+00	4.40E-02	3.22E-01	9.54E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	2.11E-03	3.31E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	5.71E+02	2.24E+01	0.00E+00	0.00E+00	7.49E-01	7.49E-01	1.84E+00	1.22E+00	3.80E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.50E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-02	3.20E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.20E+01	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-05	4.69E-02	4.70E-02				
Fluoranthene	1.70E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-04	3.62E-01	3.63E-01				
Fluorene	1.00E+01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-05	2.13E-02	2.14E-02				
Naphthalene	4.00E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-05	8.53E-03	8.60E-03				
Phenanthrene	1.20E+02	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-04	2.56E-01	2.56E-01				
Total LMW PAHs						0.00E+00	1.08E-03	7.27E-01	7.28E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.10E+02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	2.35E-01	2.35E-01				
Benzo(A)Pyrene	1.30E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-01	2.77E-01				
Benzo(b)fluoranthene	1.50E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-04	3.20E-01	3.21E-01				
Benzo(g,h,i)perylene	9.90E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	2.11E-01	2.11E-01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	1.30E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	2.77E-01	2.78E-01				
Dibenz(A,H)Anthracene	2.80E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.04E-06	5.97E-02	5.97E-02				
Indeno (1,2,3-CD) Pyrene	1.00E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-04	2.13E-01	2.13E-01				
Pyrene	2.20E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-04	4.69E-01	4.70E-01				
Total HMW PAHs						0.00E+00	2.88E-03	2.06E+00	2.06E+00	2.00E+00	1.03E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.80E+00	2.20E-02	0.00E+00	0.00E+00	3.71E-01	3.71E-01	1.80E-03	1.24E-02	3.85E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.50E-02	0.00E+00	0.00E+00	0.00E+00	3.13E-03	3.13E-03	0.00E+00	1.81E-04	3.31E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H1-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	5.80E-07	0.00E+00	0.00E+00	0.00E+00	2.57E-08	2.57E-08	0.00E+00	1.24E-09	2.70E-08				
1,2,3,7,8-PeCDD	1.53E-06	0.00E+00	0.00E+00	0.00E+00	7.47E-08	7.47E-08	0.00E+00	3.26E-09	7.80E-08				
1,2,3,4,7,8-HxCDD	4.07E-06	0.00E+00	0.00E+00	0.00E+00	2.19E-07	1.10E-08	0.00E+00	4.34E-10	1.14E-08				
1,2,3,6,7,8-HxCDD	1.92E-05	0.00E+00	0.00E+00	0.00E+00	1.21E-06	1.21E-08	0.00E+00	4.09E-10	1.25E-08				
1,2,3,7,8,9-HxCDD	9.54E-06	0.00E+00	0.00E+00	0.00E+00	5.59E-07	5.59E-08	0.00E+00	2.03E-09	5.79E-08				
1,2,3,4,6,7,8-HpCDD	6.04E-04	0.00E+00	0.00E+00	0.00E+00	5.34E-05	5.34E-08	0.00E+00	1.29E-09	5.47E-08				
OCDD	6.76E-03	0.00E+00	0.00E+00	0.00E+00	7.60E-04	7.60E-08	0.00E+00	1.44E-09	7.74E-08				
2,3,7,8-TCDF	6.15E-06	0.00E+00	0.00E+00	0.00E+00	6.31E-08	6.31E-08	0.00E+00	1.31E-08	7.62E-08				
1,2,3,7,8-PeCDF	2.84E-06	0.00E+00	0.00E+00	0.00E+00	2.91E-08	2.91E-09	0.00E+00	6.06E-10	3.52E-09				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	0.00E+00	0.00E+00	3.74E-08	3.74E-08	0.00E+00	7.78E-09	4.52E-08				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	0.00E+00	0.00E+00	5.61E-08	5.61E-09	0.00E+00	1.17E-09	6.78E-09				
1,2,3,6,7,8-HxCDF	4.00E-06	0.00E+00	0.00E+00	0.00E+00	4.10E-08	4.10E-09	0.00E+00	8.53E-10	4.96E-09				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	0.00E+00	0.00E+00	2.65E-08	2.65E-09	0.00E+00	5.50E-10	3.20E-09				
1,2,3,4,6,7,8-HpCDF	6.97E-05	0.00E+00	0.00E+00	0.00E+00	7.15E-07	7.15E-09	0.00E+00	1.49E-09	8.64E-09				
1,2,3,4,7,8,9-HpCDF	4.13E-06	0.00E+00	0.00E+00	0.00E+00	4.24E-08	4.24E-10	0.00E+00	8.81E-11	5.12E-10				
OCDF	1.90E-04	0.00E+00	0.00E+00	0.00E+00	1.95E-06	1.95E-10	0.00E+00	4.05E-11	2.35E-10				
Total Dioxins/Furans						4.32E-07	0.00E+00	3.58E-08	4.68E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i)}{BW} \times AUF$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	6.10E-01	7.70E-03	0.00E+00	9.66E-02	0.00E+00	9.66E-02	1.22E-03	0.00E+00	9.78E-02	No TRV	--	No TRV	--
Arsenic	7.60E+00	4.40E-03	0.00E+00	1.60E-01	0.00E+00	1.60E-01	6.97E-04	0.00E+00	1.61E-01	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-01	0.00E+00	4.29E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04	No TRV	--	No TRV	--
Cadmium	1.70E+00	3.00E-03	0.00E+00	2.00E+00	0.00E+00	2.00E+00	4.75E-04	0.00E+00	2.00E+00	1.47E+00	1.36E+00	6.35E+00	<1
Chromium	8.08E+01	2.72E-02	0.00E+00	3.91E+00	0.00E+00	3.91E+00	4.31E-03	0.00E+00	3.92E+00	2.66E+00	1.47E+00	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-03	0.00E+00	2.45E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.45E+01	1.83E-01	0.00E+00	2.81E+00	0.00E+00	2.81E+00	2.90E-02	0.00E+00	2.84E+00	4.05E+00	<1	3.48E+01	<1
Lead	5.77E+01	3.52E-02	0.00E+00	3.36E+00	0.00E+00	3.36E+00	5.57E-03	0.00E+00	3.36E+00	1.63E+00	2.06E+00	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-01	0.00E+00	5.94E-01	1.79E+02	<1	3.77E+02	<1
Mercury	6.90E-02	2.60E-04	0.00E+00	4.29E-02	0.00E+00	4.29E-02	4.12E-05	0.00E+00	4.30E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.40E+02	5.59E-02	0.00E+00	1.72E+01	0.00E+00	1.72E+01	8.85E-03	0.00E+00	1.73E+01	6.71E+00	2.57E+00	1.86E+01	<1
Selenium	6.60E-01	0.00E+00	0.00E+00	1.08E-01	0.00E+00	1.08E-01	0.00E+00	0.00E+00	1.08E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-05	0.00E+00	5.22E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	3.16E+01	2.48E-02	0.00E+00	2.10E-01	0.00E+00	2.10E-01	3.93E-03	0.00E+00	2.14E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.51E+02	5.37E-01	0.00E+00	7.02E+01	0.00E+00	7.02E+01	8.50E-02	0.00E+00	7.03E+01	6.61E+01	1.06E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	5.71E+02	2.24E+01	0.00E+00	1.12E+01	0.00E+00	1.12E+01	3.55E+00	0.00E+00	1.48E+01	1.22E+01	1.21E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.50E+01	0.00E+00	0.00E+00	3.49E+00	0.00E+00	3.49E+00	0.00E+00	0.00E+00	3.49E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.20E+01	6.20E-04	0.00E+00	8.43E+00	0.00E+00	8.43E+00	9.82E-05	0.00E+00	8.43E+00				
Fluoranthene	1.70E+02	9.30E-03	0.00E+00	8.18E+01	0.00E+00	8.18E+01	1.47E-03	0.00E+00	8.18E+01				
Fluorene	1.00E+01	8.70E-04	0.00E+00	1.52E+01	0.00E+00	1.52E+01	1.38E-04	0.00E+00	1.52E+01				
Naphthalene	4.00E+00	8.70E-04	0.00E+00	2.79E+00	0.00E+00	2.79E+00	1.38E-04	0.00E+00	2.79E+00				
Phenanthrene	1.20E+02	1.50E-03	0.00E+00	3.27E+01	0.00E+00	3.27E+01	2.37E-04	0.00E+00	3.27E+01				
Total LMW PAHs						1.44E+02	2.08E-03	0.00E+00	1.44E+02	1.61E+01	8.97E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.10E+02	3.00E-03	0.00E+00	2.77E+01	0.00E+00	2.77E+01	4.75E-04	0.00E+00	2.77E+01				
Benzo(A)Pyrene	1.30E+02	0.00E+00	0.00E+00	2.74E+01	0.00E+00	2.74E+01	0.00E+00	0.00E+00	2.74E+01				
Benzo(b)fluoranthene	1.50E+02	1.00E-02	0.00E+00	6.17E+01	0.00E+00	6.17E+01	1.58E-03	0.00E+00	6.18E+01				
Benzo(g,h,i)perylene	9.90E+01	3.90E-03	0.00E+00	4.61E+01	0.00E+00	4.61E+01	6.17E-04	0.00E+00	4.61E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	1.30E+02	7.60E-03	0.00E+00	4.71E+01	0.00E+00	4.71E+01	1.20E-03	0.00E+00	4.71E+01				
Dibenz(A,H)Anthracene	2.80E+01	9.80E-05	0.00E+00	1.02E+01	0.00E+00	1.02E+01	1.55E-05	0.00E+00	1.02E+01				
Indeno (1,2,3-CD) Pyrene	1.00E+02	3.10E-03	0.00E+00	4.53E+01	0.00E+00	4.53E+01	4.91E-04	0.00E+00	4.53E+01				
Pyrene	2.20E+02	7.00E-03	0.00E+00	6.10E+01	0.00E+00	6.10E+01	1.11E-03	0.00E+00	6.10E+01				
Total HMW PAHs						3.27E+02	5.57E-03	0.00E+00	3.27E+02	2.00E+00	1.63E+02	2.00E+01	1.63E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.80E+00	2.20E-02	0.00E+00	5.00E+01	0.00E+00	5.00E+01	3.48E-03	0.00E+00	5.00E+01	1.10E+00	4.54E+01	1.10E+01	4.54E+00
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.50E-02	0.00E+00	0.00E+00	1.39E-01	0.00E+00	1.39E-01	0.00E+00	0.00E+00	1.39E-01	1.10E-01	1.26E+00	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H1-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	5.80E-07	0.00E+00	0.00E+00	2.30E-07	0.00E+00	2.30E-07	0.00E+00	0.00E+00	2.30E-07				
1,2,3,7,8-PeCDD	1.53E-06	0.00E+00	0.00E+00	7.25E-07	0.00E+00	7.25E-07	0.00E+00	0.00E+00	7.25E-07				
1,2,3,4,7,8-HxCDD	4.07E-06	0.00E+00	0.00E+00	2.30E-06	0.00E+00	1.15E-07	0.00E+00	0.00E+00	1.15E-07				
1,2,3,6,7,8-HxCDD	1.92E-05	0.00E+00	0.00E+00	1.44E-05	0.00E+00	1.44E-07	0.00E+00	0.00E+00	1.44E-07				
1,2,3,7,8,9-HxCDD	9.54E-06	0.00E+00	0.00E+00	6.31E-06	0.00E+00	6.31E-07	0.00E+00	0.00E+00	6.31E-07				
1,2,3,4,6,7,8-HpCDD	6.04E-04	0.00E+00	0.00E+00	8.49E-04	0.00E+00	8.49E-07	0.00E+00	0.00E+00	8.49E-07				
OCDD	6.76E-03	0.00E+00	0.00E+00	1.48E-02	0.00E+00	1.48E-06	0.00E+00	0.00E+00	1.48E-06				
2,3,7,8-TCDF	6.15E-06	0.00E+00	0.00E+00	3.75E-06	0.00E+00	3.75E-06	0.00E+00	0.00E+00	3.75E-06				
1,2,3,7,8-PeCDF	2.84E-06	0.00E+00	0.00E+00	1.51E-06	0.00E+00	1.51E-07	0.00E+00	0.00E+00	1.51E-07				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	0.00E+00	2.03E-06	0.00E+00	2.03E-06	0.00E+00	0.00E+00	2.03E-06				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	0.00E+00	3.27E-06	0.00E+00	3.27E-07	0.00E+00	0.00E+00	3.27E-07				
1,2,3,6,7,8-HxCDF	4.00E-06	0.00E+00	0.00E+00	2.26E-06	0.00E+00	2.26E-07	0.00E+00	0.00E+00	2.26E-07				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	0.00E+00	1.34E-06	0.00E+00	1.34E-07	0.00E+00	0.00E+00	1.34E-07				
1,2,3,4,6,7,8-HpCDF	6.97E-05	0.00E+00	0.00E+00	6.62E-05	0.00E+00	6.62E-07	0.00E+00	0.00E+00	6.62E-07				
1,2,3,4,7,8,9-HpCDF	4.13E-06	0.00E+00	0.00E+00	2.34E-06	0.00E+00	2.34E-08	0.00E+00	0.00E+00	2.34E-08				
OCDF	1.90E-04	0.00E+00	0.00E+00	2.16E-04	0.00E+00	2.16E-08	0.00E+00	0.00E+00	2.16E-08				
Total Dioxins/Furans						1.15E-05	0.00E+00	0.00E+00	1.15E-05	1.75E-06	6.57E+00	1.75E-05	<1

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-6
Screening-Level Exposure Evaluation - Canada Lynx
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	6.10E-01	7.70E-03	0.00E+00	0.00E+00	9.53E-04	9.53E-04	2.41E-04	5.34E-04	1.73E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	7.60E+00	4.40E-03	0.00E+00	0.00E+00	1.29E-03	1.29E-03	1.37E-04	6.65E-03	8.08E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.47E-02	0.00E+00	8.47E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.70E+00	3.00E-03	0.00E+00	0.00E+00	1.14E-02	1.14E-02	9.37E-05	1.49E-03	1.30E-02	7.70E-01	<1	6.87E+00	<1
Chromium	8.08E+01	2.72E-02	0.00E+00	0.00E+00	1.82E-01	1.82E-01	8.50E-04	7.07E-02	2.54E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-04	0.00E+00	4.84E-04	7.33E+00	<1	1.89E+01	<1
Copper	3.45E+01	1.83E-01	0.00E+00	0.00E+00	4.01E-01	4.01E-01	5.72E-03	3.02E-02	4.37E-01	5.60E+00	<1	8.27E+01	<1
Lead	5.77E+01	3.52E-02	0.00E+00	0.00E+00	2.03E-01	2.03E-01	1.10E-03	5.05E-02	2.54E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.17E-01	5.15E+01	<1	1.46E+02	<1
Mercury	6.90E-02	2.60E-04	0.00E+00	0.00E+00	8.21E-04	8.21E-04	8.12E-06	6.04E-05	8.90E-04	1.41E+00	<1	1.41E+01	<1
Nickel	1.40E+02	5.59E-02	0.00E+00	0.00E+00	2.44E-01	2.44E-01	1.75E-03	1.22E-01	3.68E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.60E-01	0.00E+00	0.00E+00	0.00E+00	1.76E-02	1.76E-02	0.00E+00	5.77E-04	1.82E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-05	0.00E+00	1.03E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	3.16E+01	2.48E-02	0.00E+00	0.00E+00	1.21E-02	1.21E-02	7.75E-04	2.76E-02	4.06E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.51E+02	5.37E-01	0.00E+00	0.00E+00	3.50E+00	3.50E+00	1.68E-02	1.32E-01	3.64E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	8.66E-04	1.27E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	5.71E+02	2.24E+01	0.00E+00	0.00E+00	2.85E-01	2.85E-01	7.00E-01	5.00E-01	1.48E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.50E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-02	1.31E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.20E+01	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-05	1.92E-02	1.93E-02				
Fluoranthene	1.70E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-04	1.49E-01	1.49E-01				
Fluorene	1.00E+01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-05	8.75E-03	8.78E-03				
Naphthalene	4.00E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-05	3.50E-03	3.53E-03				
Phenanthrene	1.20E+02	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-05	1.05E-01	1.05E-01				
Total LMW PAHs						0.00E+00	4.11E-04	2.98E-01	2.99E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.10E+02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	9.62E-02	9.63E-02				
Benzo(A)Pyrene	1.30E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-01	1.14E-01				
Benzo(b)fluoranthene	1.50E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-04	1.31E-01	1.32E-01				
Benzo(g,h,i)perylene	9.90E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	8.66E-02	8.67E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	1.30E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	1.14E-01	1.14E-01				
Dibenz(A,H)Anthracene	2.80E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-06	2.45E-02	2.45E-02				
Indeno (1,2,3-CD) Pyrene	1.00E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	8.75E-02	8.76E-02				
Pyrene	2.20E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-04	1.92E-01	1.93E-01				
Total HMW PAHs						0.00E+00	1.10E-03	8.46E-01	8.47E-01	6.15E-01	1.38E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.80E+00	2.20E-02	0.00E+00	0.00E+00	1.41E-01	1.41E-01	6.87E-04	5.07E-03	1.47E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.50E-02	0.00E+00	0.00E+00	0.00E+00	1.19E-03	1.19E-03	0.00E+00	7.44E-05	1.27E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	--	2.27E+01	--

Table H1-6
Screening-Level Exposure Evaluation - Canada Lynx
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	5.80E-07	0.00E+00	0.00E+00	0.00E+00	9.80E-09	9.80E-09	0.00E+00	5.07E-10	1.03E-08				
1,2,3,7,8-PeCDD	1.53E-06	0.00E+00	0.00E+00	0.00E+00	2.85E-08	2.85E-08	0.00E+00	1.34E-09	2.98E-08				
1,2,3,4,7,8-HxCDD	4.07E-06	0.00E+00	0.00E+00	0.00E+00	8.35E-08	8.35E-09	0.00E+00	3.56E-10	8.70E-09				
1,2,3,6,7,8-HxCDD	1.92E-05	0.00E+00	0.00E+00	0.00E+00	4.59E-07	4.59E-08	0.00E+00	1.68E-09	4.76E-08				
1,2,3,7,8,9-HxCDD	9.54E-06	0.00E+00	0.00E+00	0.00E+00	2.13E-07	2.13E-08	0.00E+00	8.35E-10	2.21E-08				
1,2,3,4,6,7,8-HpCDD	6.04E-04	0.00E+00	0.00E+00	0.00E+00	2.03E-05	2.03E-07	0.00E+00	5.28E-09	2.09E-07				
OCDD	6.76E-03	0.00E+00	0.00E+00	0.00E+00	2.89E-04	8.68E-08	0.00E+00	1.77E-09	8.86E-08				
2,3,7,8-TCDF	6.15E-06	0.00E+00	0.00E+00	0.00E+00	2.40E-08	2.40E-09	0.00E+00	5.38E-10	2.94E-09				
1,2,3,7,8-PeCDF	2.84E-06	0.00E+00	0.00E+00	0.00E+00	1.11E-08	3.33E-10	0.00E+00	7.45E-11	4.08E-10				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	0.00E+00	0.00E+00	1.43E-08	4.28E-09	0.00E+00	9.58E-10	5.24E-09				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	0.00E+00	0.00E+00	2.14E-08	2.14E-09	0.00E+00	4.79E-10	2.62E-09				
1,2,3,6,7,8-HxCDF	4.00E-06	0.00E+00	0.00E+00	0.00E+00	1.56E-08	1.56E-09	0.00E+00	3.50E-10	1.91E-09				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	0.00E+00	0.00E+00	1.01E-08	1.01E-09	0.00E+00	2.26E-10	1.23E-09				
1,2,3,4,6,7,8-HpCDF	6.97E-05	0.00E+00	0.00E+00	0.00E+00	2.72E-07	2.72E-09	0.00E+00	6.10E-10	3.33E-09				
1,2,3,4,7,8,9-HpCDF	4.13E-06	0.00E+00	0.00E+00	0.00E+00	1.61E-08	1.61E-10	0.00E+00	3.61E-11	1.98E-10				
OCDF	1.90E-04	0.00E+00	0.00E+00	0.00E+00	7.43E-07	2.23E-10	0.00E+00	4.99E-11	2.73E-10				
Total Dioxins/Furans						4.19E-07	0.00E+00	1.51E-08	4.34E-07	5.62E-07	<1	3.76E-06	<1

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-7
Screening-Level Exposure Evaluation - Grizzly Bear
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	6.10E-01	7.70E-03	3.48E-04	1.98E-03	6.59E-05	0.00E+00	2.39E-03	1.66E-04	3.69E-04	2.56E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	7.60E+00	4.40E-03	4.00E-03	3.27E-03	8.92E-05	0.00E+00	7.37E-03	9.50E-05	4.60E-03	7.46E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.85E-02	0.00E+00	5.85E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.70E+00	3.00E-03	1.17E-02	4.09E-02	7.89E-04	0.00E+00	5.34E-02	6.48E-05	1.03E-03	5.34E-02	7.70E-01	<1	6.87E+00	<1
Chromium	8.08E+01	2.72E-02	4.65E-02	8.01E-02	1.26E-02	0.00E+00	1.39E-01	5.87E-04	4.89E-02	1.40E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04	0.00E+00	3.35E-04	7.33E+00	<1	1.89E+01	<1
Copper	3.45E+01	1.83E-01	1.10E-01	5.76E-02	2.77E-02	0.00E+00	1.96E-01	3.95E-03	2.09E-02	2.00E-01	5.60E+00	<1	8.27E+01	<1
Lead	5.77E+01	3.52E-02	3.62E-02	6.87E-02	1.40E-02	0.00E+00	1.19E-01	7.60E-04	3.49E-02	1.20E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.10E-02	0.00E+00	8.10E-02	5.15E+01	<1	1.46E+02	<1
Mercury	6.90E-02	2.60E-04	1.21E-03	8.78E-04	5.68E-05	0.00E+00	2.15E-03	5.61E-06	4.17E-05	2.15E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.40E+02	5.59E-02	6.13E-02	3.53E-01	1.69E-02	0.00E+00	4.31E-01	1.21E-03	8.47E-02	4.32E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.60E-01	0.00E+00	4.51E-03	2.22E-03	1.22E-03	0.00E+00	7.94E-03	0.00E+00	3.99E-04	7.94E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-06	0.00E+00	7.13E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	3.16E+01	2.48E-02	2.15E-03	4.30E-03	8.39E-04	0.00E+00	7.29E-03	5.36E-04	1.91E-02	7.83E-03	4.16E+00	<1	9.44E+00	<1
Zinc	1.51E+02	5.37E-01	1.09E+00	1.44E+00	2.42E-01	0.00E+00	2.77E+00	1.16E-02	9.13E-02	2.78E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	9.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	5.99E-04	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	5.71E+02	2.24E+01	4.81E-01	2.29E-01	1.97E-02	0.00E+00	7.30E-01	4.84E-01	3.45E-01	1.21E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	1.50E+01	0.00E+00	5.31E-06	7.14E-02	0.00E+00	0.00E+00	7.14E-02	0.00E+00	9.07E-03	7.14E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.20E+01	6.20E-04	5.79E-02	1.72E-01	0.00E+00	0.00E+00	2.30E-01	1.34E-05	1.33E-02	2.30E-01				
Fluoranthene	1.70E+02	9.30E-03	1.19E+00	1.67E+00	0.00E+00	0.00E+00	2.87E+00	2.01E-04	1.03E-01	2.87E+00				
Fluorene	1.00E+01	8.70E-04	7.52E-06	3.10E-01	0.00E+00	0.00E+00	3.10E-01	1.88E-05	6.05E-03	3.10E-01				
Naphthalene	4.00E+00	8.70E-04	6.85E-01	5.70E-02	0.00E+00	0.00E+00	7.42E-01	1.88E-05	2.42E-03	7.42E-01				
Phenanthrene	1.20E+02	1.50E-03	2.32E-01	6.69E-01	0.00E+00	0.00E+00	9.00E-01	3.24E-05	7.26E-02	9.00E-01				
Total LMW PAHs							5.12E+00	2.84E-04	2.06E-01	5.33E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.10E+02	3.00E-03	1.53E-02	5.67E-01	0.00E+00	0.00E+00	5.82E-01	6.48E-05	6.65E-02	5.82E-01				
Benzo(A)Pyrene	1.30E+02	0.00E+00	2.06E-01	5.60E-01	0.00E+00	0.00E+00	7.66E-01	0.00E+00	7.86E-02	7.66E-01				
Benzo(b)fluoranthene	1.50E+02	1.00E-02	6.53E-01	1.26E+00	0.00E+00	0.00E+00	1.92E+00	2.16E-04	9.07E-02	1.92E+00				
Benzo(g,h,i)perylene	9.90E+01	3.90E-03	1.27E+00	9.43E-01	0.00E+00	0.00E+00	2.21E+00	8.42E-05	5.99E-02	2.21E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	1.30E+02	7.60E-03	1.69E-02	9.64E-01	0.00E+00	0.00E+00	9.81E-01	1.64E-04	7.86E-02	9.81E-01				
Dibenz(A,H)Anthracene	2.80E+01	9.80E-05	5.11E-02	2.10E-01	0.00E+00	0.00E+00	2.61E-01	2.12E-06	1.69E-02	2.61E-01				
Indeno (1,2,3-CD) Pyrene	1.00E+02	3.10E-03	1.54E-01	9.26E-01	0.00E+00	0.00E+00	1.08E+00	6.69E-05	6.05E-02	1.08E+00				
Pyrene	2.20E+02	7.00E-03	2.22E+00	1.25E+00	0.00E+00	0.00E+00	3.47E+00	1.51E-04	1.33E-01	3.47E+00				
Total HMW PAHs							1.13E+01	7.59E-04	5.85E-01	1.19E+01	6.15E-01	1.93E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.80E+00	2.20E-02	1.94E-03	1.02E+00	9.76E-03	0.00E+00	1.03E+00	4.75E-04	3.51E-03	1.03E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.50E-02	0.00E+00	9.71E-04	2.84E-03	8.24E-05	0.00E+00	3.89E-03	0.00E+00	5.14E-05	3.89E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H1-7
Screening-Level Exposure Evaluation - Grizzly Bear
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)												
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)															
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans															
2,3,7,8-TCDD	5.80E-07	0.00E+00	7.66E-10	4.71E-09	6.77E-10	0.00E+00	6.16E-09	0.00E+00	3.51E-10	6.16E-09					
1,2,3,7,8-PeCDD	1.53E-06	0.00E+00	1.11E-09	1.48E-08	1.97E-09	0.00E+00	1.79E-08	0.00E+00	9.25E-10	1.79E-08					
1,2,3,4,7,8-HxCDD	4.07E-06	0.00E+00	1.61E-09	4.71E-08	5.77E-09	0.00E+00	5.45E-09	0.00E+00	2.46E-10	5.45E-09					
1,2,3,6,7,8-HxCDD	1.92E-05	0.00E+00	7.60E-09	2.95E-07	3.17E-08	0.00E+00	3.34E-08	0.00E+00	1.16E-09	3.34E-08					
1,2,3,7,8,9-HxCDD	9.54E-06	0.00E+00	3.78E-09	1.29E-07	1.47E-08	0.00E+00	1.48E-08	0.00E+00	5.77E-10	1.48E-08					
1,2,3,4,6,7,8-HpCDD	6.04E-04	0.00E+00	1.31E-07	1.74E-05	1.41E-06	0.00E+00	1.89E-07	0.00E+00	3.65E-09	1.89E-07					
OCDD	6.76E-03	0.00E+00	8.02E-07	3.02E-04	2.00E-05	0.00E+00	9.68E-08	0.00E+00	1.23E-09	9.68E-08					
2,3,7,8-TCDF	6.15E-06	0.00E+00	1.46E-08	7.68E-08	1.66E-09	0.00E+00	9.31E-09	0.00E+00	3.72E-10	9.31E-09					
1,2,3,7,8-PeCDF	2.84E-06	0.00E+00	3.68E-09	3.08E-08	7.67E-10	0.00E+00	1.06E-09	0.00E+00	5.15E-11	1.06E-09					
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	4.73E-09	4.14E-08	9.86E-10	0.00E+00	1.41E-08	0.00E+00	6.62E-10	1.41E-08					
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	2.84E-09	6.69E-08	1.48E-09	0.00E+00	7.12E-09	0.00E+00	3.31E-10	7.12E-09					
1,2,3,6,7,8-HxCDF	4.00E-06	0.00E+00	2.08E-09	4.62E-08	1.08E-09	0.00E+00	4.93E-09	0.00E+00	2.42E-10	4.93E-09					
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	1.84E-09	2.75E-08	6.97E-10	0.00E+00	3.00E-09	0.00E+00	1.56E-10	3.00E-09					
1,2,3,4,6,7,8-HpCDF	6.97E-05	0.00E+00	2.71E-08	1.35E-06	1.88E-08	0.00E+00	1.40E-08	0.00E+00	4.21E-10	1.40E-08					
1,2,3,4,7,8,9-HpCDF	4.13E-06	0.00E+00	1.60E-09	4.80E-08	1.12E-09	0.00E+00	5.07E-10	0.00E+00	2.50E-11	5.07E-10					
OCDF	1.90E-04	0.00E+00	4.06E-08	4.43E-06	5.13E-08	0.00E+00	1.36E-09	0.00E+00	3.45E-11	1.36E-09					
Total Dioxins/Furans						0.00E+00	4.19E-07	0.00E+00	1.04E-08	4.30E-07	5.62E-07	<1	3.76E-06	<1	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	4.20E-01	7.70E-03	0.00E+00	0.00E+00	1.08E-03	1.08E-03	3.96E-04	3.46E-04	1.82E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	8.10E+00	4.40E-03	0.00E+00	0.00E+00	2.24E-03	2.24E-03	2.26E-04	6.67E-03	9.14E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-01	0.00E+00	1.39E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	8.75E-01	3.00E-03	0.00E+00	0.00E+00	1.37E-02	1.37E-02	1.54E-04	7.20E-04	1.46E-02	7.70E-01	<1	6.87E+00	<1
Chromium	3.53E+01	2.72E-02	0.00E+00	0.00E+00	1.63E-01	1.63E-01	1.40E-03	2.90E-02	1.94E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-04	0.00E+00	7.98E-04	7.33E+00	<1	1.89E+01	<1
Copper	4.51E+01	1.83E-01	0.00E+00	0.00E+00	6.87E-01	6.87E-01	9.42E-03	3.71E-02	7.34E-01	5.60E+00	<1	8.27E+01	<1
Lead	3.82E+01	3.52E-02	0.00E+00	0.00E+00	2.78E-01	2.78E-01	1.81E-03	3.14E-02	3.11E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-01	0.00E+00	1.93E-01	5.15E+01	<1	1.46E+02	<1
Mercury	2.20E-01	2.60E-04	0.00E+00	0.00E+00	4.31E-03	4.31E-03	1.34E-05	1.81E-04	4.50E-03	1.41E+00	<1	1.41E+01	<1
Nickel	9.27E+01	5.59E-02	0.00E+00	0.00E+00	3.32E-01	3.32E-01	2.88E-03	7.63E-02	4.11E-01	1.70E+00	<1	1.48E+01	<1
Selenium	5.70E-01	0.00E+00	0.00E+00	0.00E+00	2.75E-02	2.75E-02	0.00E+00	4.69E-04	2.79E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-05	0.00E+00	1.70E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.88E+01	2.48E-02	0.00E+00	0.00E+00	1.82E-02	1.82E-02	1.28E-03	2.37E-02	4.32E-02	4.16E+00	<1	9.44E+00	<1
Zinc	2.04E+02	5.37E-01	0.00E+00	0.00E+00	5.88E+00	5.88E+00	2.76E-02	1.68E-01	6.08E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.40E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	1.98E-03	2.14E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	4.18E+02	2.24E+01	0.00E+00	0.00E+00	3.44E-01	3.44E-01	1.15E+00	3.44E-01	1.84E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-03	4.69E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	8.95E+00	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-05	7.37E-03	7.40E-03				
Fluoranthene	8.40E+01	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-04	6.92E-02	6.96E-02				
Fluorene	4.00E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-05	3.29E-03	3.34E-03				
Naphthalene	2.43E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-05	2.00E-03	2.04E-03				
Phenanthrene	5.03E+01	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-05	4.14E-02	4.15E-02				
Total LMW PAHs						0.00E+00	6.77E-04	1.28E-01	1.29E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.18E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	3.44E-02	3.45E-02				
Benzo(A)Pyrene	5.05E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-02	4.16E-02				
Benzo(b)fluoranthene	5.70E+01	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	4.69E-02	4.74E-02				
Benzo(g,h,i)perylene	4.20E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	3.46E-02	3.48E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	5.18E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	4.26E-02	4.30E-02				
Dibenz(A,H)Anthracene	1.00E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-06	8.23E-03	8.24E-03				
Indeno (1,2,3-CD) Pyrene	4.38E+01	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-04	3.60E-02	3.62E-02				
Pyrene	8.43E+01	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	6.94E-02	6.97E-02				
Total HMW PAHs						0.00E+00	1.81E-03	3.14E-01	3.16E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.56E+00	2.20E-02	0.00E+00	0.00E+00	6.23E-02	6.23E-02	1.13E-03	1.28E-03	6.48E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.63E-01	0.00E+00	0.00E+00	0.00E+00	3.75E-03	3.75E-03	0.00E+00	1.34E-04	3.89E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H1-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.58E-07	0.00E+00	0.00E+00	0.00E+00	3.86E-09	3.86E-09	0.00E+00	1.30E-10	3.99E-09				
1,2,3,7,8-PeCDD	9.30E-07	0.00E+00	0.00E+00	0.00E+00	2.71E-08	2.71E-08	0.00E+00	7.66E-10	2.79E-08				
1,2,3,4,7,8-HxCDD	2.40E-06	0.00E+00	0.00E+00	0.00E+00	7.69E-08	7.69E-09	0.00E+00	1.98E-10	7.89E-09				
1,2,3,6,7,8-HxCDD	1.07E-05	0.00E+00	0.00E+00	0.00E+00	3.98E-07	3.98E-08	0.00E+00	8.81E-10	4.07E-08				
1,2,3,7,8,9-HxCDD	5.99E-06	0.00E+00	0.00E+00	0.00E+00	2.10E-07	2.10E-08	0.00E+00	4.93E-10	2.15E-08				
1,2,3,4,6,7,8-HpCDD	3.36E-04	0.00E+00	0.00E+00	0.00E+00	1.76E-05	1.76E-07	0.00E+00	2.77E-09	1.79E-07				
OCDD	3.83E-03	0.00E+00	0.00E+00	0.00E+00	2.55E-04	7.65E-08	0.00E+00	9.45E-10	7.75E-08				
2,3,7,8-TCDF	2.69E-06	0.00E+00	0.00E+00	0.00E+00	1.73E-08	1.73E-09	0.00E+00	2.21E-10	1.95E-09				
1,2,3,7,8-PeCDF	1.58E-06	0.00E+00	0.00E+00	0.00E+00	1.02E-08	3.05E-10	0.00E+00	3.90E-11	3.44E-10				
2,3,4,7,8-PeCDF	1.92E-06	0.00E+00	0.00E+00	0.00E+00	1.24E-08	3.71E-09	0.00E+00	4.74E-10	4.18E-09				
1,2,3,4,7,8-HxCDF	7.23E-06	0.00E+00	0.00E+00	0.00E+00	4.65E-08	4.65E-09	0.00E+00	5.95E-10	5.25E-09				
1,2,3,6,7,8-HxCDF	2.16E-06	0.00E+00	0.00E+00	0.00E+00	1.39E-08	1.39E-09	0.00E+00	1.78E-10	1.57E-09				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	0.00E+00	0.00E+00	6.76E-10	6.76E-11	0.00E+00	8.65E-12	7.62E-11				
1,2,3,7,8,9-HxCDF	3.44E-06	0.00E+00	0.00E+00	0.00E+00	2.21E-08	2.21E-09	0.00E+00	2.83E-10	2.50E-09				
1,2,3,4,6,7,8-HpCDF	4.98E-05	0.00E+00	0.00E+00	0.00E+00	3.21E-07	3.21E-09	0.00E+00	4.10E-10	3.62E-09				
1,2,3,4,7,8,9-HpCDF	2.62E-06	0.00E+00	0.00E+00	0.00E+00	1.69E-08	1.69E-10	0.00E+00	2.16E-11	1.90E-10				
OCDF	1.24E-04	0.00E+00	0.00E+00	0.00E+00	7.98E-07	2.39E-10	0.00E+00	3.06E-11	2.70E-10				
Total Dioxins/Furans						3.70E-07	0.00E+00	8.44E-09	3.78E-07	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-9
Screening-Level Exposure Evaluation - Meadow Vole
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	4.20E-01	7.70E-03	2.63E-03	0.00E+00	0.00E+00	2.63E-03	1.16E-03	8.20E-04	4.60E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	8.10E+00	4.40E-03	4.57E-02	0.00E+00	0.00E+00	4.57E-02	6.61E-04	1.58E-02	6.21E-02	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-01	0.00E+00	4.07E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	8.75E-01	3.00E-03	8.69E-02	0.00E+00	0.00E+00	8.69E-02	4.51E-04	1.71E-03	8.90E-02	7.70E-01	<1	6.87E+00	<1
Chromium	3.53E+01	2.72E-02	2.17E-01	0.00E+00	0.00E+00	2.17E-01	4.09E-03	6.88E-02	2.90E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-03	0.00E+00	2.33E-03	7.33E+00	<1	1.89E+01	<1
Copper	4.51E+01	1.83E-01	1.31E+00	0.00E+00	0.00E+00	1.31E+00	2.75E-02	8.81E-02	1.43E+00	5.60E+00	<1	8.27E+01	<1
Lead	3.82E+01	3.52E-02	3.07E-01	0.00E+00	0.00E+00	3.07E-01	5.29E-03	7.45E-02	3.87E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.63E-01	0.00E+00	5.63E-01	5.15E+01	<1	1.46E+02	<1
Mercury	2.20E-01	2.60E-04	2.43E-02	0.00E+00	0.00E+00	2.43E-02	3.91E-05	4.29E-04	2.48E-02	1.41E+00	<1	1.41E+01	<1
Nickel	9.27E+01	5.59E-02	4.82E-01	0.00E+00	0.00E+00	4.82E-01	8.40E-03	1.81E-01	6.71E-01	1.70E+00	<1	1.48E+01	<1
Selenium	5.70E-01	0.00E+00	4.10E-02	0.00E+00	0.00E+00	4.10E-02	0.00E+00	1.11E-03	4.22E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.96E-05	0.00E+00	4.96E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.88E+01	2.48E-02	2.10E-02	0.00E+00	0.00E+00	2.10E-02	3.73E-03	5.62E-02	8.09E-02	4.16E+00	<1	9.44E+00	<1
Zinc	2.04E+02	5.37E-01	1.38E+01	0.00E+00	0.00E+00	1.38E+01	8.07E-02	3.99E-01	1.43E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.40E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-02	4.69E-03	6.15E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	4.18E+02	2.24E+01	3.77E+00	0.00E+00	0.00E+00	3.77E+00	3.37E+00	8.16E-01	7.95E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.70E+00	0.00E+00	1.30E-04	0.00E+00	0.00E+00	1.30E-04	0.00E+00	1.11E-02	1.13E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	8.95E+00	6.20E-04	3.08E-01	0.00E+00	0.00E+00	3.08E-01	9.31E-05	1.75E-02	3.25E-01				
Fluoranthene	8.40E+01	9.30E-03	6.31E+00	0.00E+00	0.00E+00	6.31E+00	1.40E-03	1.64E-01	6.48E+00				
Fluorene	4.00E+00	8.70E-04	1.76E-04	0.00E+00	0.00E+00	1.76E-04	1.31E-04	7.81E-03	8.12E-03				
Naphthalene	2.43E+00	8.70E-04	4.44E+00	0.00E+00	0.00E+00	4.44E+00	1.31E-04	4.74E-03	4.45E+00				
Phenanthrene	5.03E+01	1.50E-03	1.44E+00	0.00E+00	0.00E+00	1.44E+00	2.25E-04	9.81E-02	1.54E+00				
Total LMW PAHs						1.25E+01	1.98E-03	3.03E-01	1.28E+01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.18E+01	3.00E-03	9.21E-02	0.00E+00	0.00E+00	9.21E-02	4.51E-04	8.15E-02	1.74E-01				
Benzo(A)Pyrene	5.05E+01	0.00E+00	8.75E-01	0.00E+00	0.00E+00	8.75E-01	0.00E+00	9.86E-02	9.74E-01				
Benzo(b)fluoranthene	5.70E+01	1.00E-02	2.65E+00	0.00E+00	0.00E+00	2.65E+00	1.50E-03	1.11E-01	2.77E+00				
Benzo(g,h,i)perylene	4.20E+01	3.90E-03	4.93E+00	0.00E+00	0.00E+00	4.93E+00	5.86E-04	8.20E-02	5.01E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.91E-05	--	6.91E-05				
Chrysene	5.18E+01	7.60E-03	1.05E-01	0.00E+00	0.00E+00	1.05E-01	1.14E-03	1.01E-01	2.07E-01				
Dibenz(A,H)Anthracene	1.00E+01	9.80E-05	1.95E-01	0.00E+00	0.00E+00	1.95E-01	1.47E-05	1.95E-02	2.15E-01				
Indeno (1,2,3-CD) Pyrene	4.38E+01	3.10E-03	7.23E-01	0.00E+00	0.00E+00	7.23E-01	4.66E-04	8.54E-02	8.09E-01				
Pyrene	8.43E+01	7.00E-03	9.11E+00	0.00E+00	0.00E+00	9.11E+00	1.05E-03	1.65E-01	9.28E+00				
Total HMW PAHs						1.87E+01	5.28E-03	7.44E-01	1.94E+01	6.15E-01	3.16E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.56E+00	2.20E-02	5.56E-03	0.00E+00	0.00E+00	5.56E-03	3.31E-03	3.04E-03	1.19E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.63E-01	0.00E+00	1.99E-02	0.00E+00	0.00E+00	1.99E-02	0.00E+00	3.17E-04	2.02E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H1-9
Screening-Level Exposure Evaluation - Meadow Vole
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.58E-07	0.00E+00	2.23E-09	0.00E+00	0.00E+00	2.23E-09	0.00E+00	3.09E-10	2.54E-09				
1,2,3,7,8-PeCDD	9.30E-07	0.00E+00	7.23E-09	0.00E+00	0.00E+00	7.23E-09	0.00E+00	1.82E-09	9.05E-09				
1,2,3,4,7,8-HxCDD	2.40E-06	0.00E+00	1.02E-08	0.00E+00	0.00E+00	1.02E-09	0.00E+00	4.69E-10	1.49E-09				
1,2,3,6,7,8-HxCDD	1.07E-05	0.00E+00	4.53E-08	0.00E+00	0.00E+00	4.53E-09	0.00E+00	2.09E-09	6.62E-09				
1,2,3,7,8,9-HxCDD	5.99E-06	0.00E+00	2.54E-08	0.00E+00	0.00E+00	2.54E-09	0.00E+00	1.17E-09	3.71E-09				
1,2,3,4,6,7,8-HpCDD	3.36E-04	0.00E+00	7.83E-07	0.00E+00	0.00E+00	7.83E-09	0.00E+00	6.56E-09	1.44E-08				
OCDD	3.83E-03	0.00E+00	4.86E-06	0.00E+00	0.00E+00	1.46E-09	0.00E+00	2.24E-09	3.70E-09				
2,3,7,8-TCDF	2.69E-06	0.00E+00	6.85E-08	0.00E+00	0.00E+00	6.85E-09	0.00E+00	5.25E-10	7.38E-09				
1,2,3,7,8-PeCDF	1.58E-06	0.00E+00	2.19E-08	0.00E+00	0.00E+00	6.58E-10	0.00E+00	9.26E-11	7.50E-10				
2,3,4,7,8-PeCDF	1.92E-06	0.00E+00	2.66E-08	0.00E+00	0.00E+00	7.99E-09	0.00E+00	1.12E-09	9.12E-09				
1,2,3,4,7,8-HxCDF	7.23E-06	0.00E+00	4.02E-08	0.00E+00	0.00E+00	4.02E-09	0.00E+00	1.41E-09	5.43E-09				
1,2,3,6,7,8-HxCDF	2.16E-06	0.00E+00	1.20E-08	0.00E+00	0.00E+00	1.20E-09	0.00E+00	4.22E-10	1.62E-09				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	5.83E-10	0.00E+00	0.00E+00	5.83E-11	0.00E+00	2.05E-11	7.88E-11				
1,2,3,7,8,9-HxCDF	3.44E-06	0.00E+00	2.62E-08	0.00E+00	0.00E+00	2.62E-09	0.00E+00	6.72E-10	3.30E-09				
1,2,3,4,6,7,8-HpCDF	4.98E-05	0.00E+00	2.07E-07	0.00E+00	0.00E+00	2.07E-09	0.00E+00	9.73E-10	3.04E-09				
1,2,3,4,7,8,9-HpCDF	2.62E-06	0.00E+00	1.09E-08	0.00E+00	0.00E+00	1.09E-10	0.00E+00	5.12E-11	1.60E-10				
OCDF	1.24E-04	0.00E+00	2.84E-07	0.00E+00	0.00E+00	8.51E-11	0.00E+00	7.27E-11	1.58E-10				
Total Dioxins/Furans						5.25E-08	0.00E+00	2.00E-08	7.25E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H1-10
Screening-Level Exposure Evaluation - North American Wolverine
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	4.20E-01	7.70E-03	0.00E+00	0.00E+00	6.31E-04	6.31E-04	2.31E-04	3.53E-04	1.22E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	8.10E+00	4.40E-03	0.00E+00	0.00E+00	1.31E-03	1.31E-03	1.32E-04	6.81E-03	8.25E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.14E-02	0.00E+00	8.14E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	8.75E-01	3.00E-03	0.00E+00	0.00E+00	8.02E-03	8.02E-03	9.01E-05	7.36E-04	8.85E-03	7.70E-01	<1	6.87E+00	<1
Chromium	3.53E+01	2.72E-02	0.00E+00	0.00E+00	9.53E-02	9.53E-02	8.17E-04	2.97E-02	1.26E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-04	0.00E+00	4.66E-04	7.33E+00	<1	1.89E+01	<1
Copper	4.51E+01	1.83E-01	0.00E+00	0.00E+00	4.01E-01	4.01E-01	5.50E-03	3.79E-02	4.45E-01	5.60E+00	<1	8.27E+01	<1
Lead	3.82E+01	3.52E-02	0.00E+00	0.00E+00	1.62E-01	1.62E-01	1.06E-03	3.21E-02	1.95E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-01	0.00E+00	1.13E-01	5.15E+01	<1	1.46E+02	<1
Mercury	2.20E-01	2.60E-04	0.00E+00	0.00E+00	2.52E-03	2.52E-03	7.81E-06	1.85E-04	2.71E-03	1.41E+00	<1	1.41E+01	<1
Nickel	9.27E+01	5.59E-02	0.00E+00	0.00E+00	1.94E-01	1.94E-01	1.68E-03	7.80E-02	2.73E-01	1.70E+00	<1	1.48E+01	<1
Selenium	5.70E-01	0.00E+00	0.00E+00	0.00E+00	1.60E-02	1.60E-02	0.00E+00	4.80E-04	1.65E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.92E-06	0.00E+00	9.92E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	2.88E+01	2.48E-02	0.00E+00	0.00E+00	1.06E-02	1.06E-02	7.45E-04	2.42E-02	3.56E-02	4.16E+00	<1	9.44E+00	<1
Zinc	2.04E+02	5.37E-01	0.00E+00	0.00E+00	3.43E+00	3.43E+00	1.61E-02	1.72E-01	3.62E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.40E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	2.02E-03	1.34E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	4.18E+02	2.24E+01	0.00E+00	0.00E+00	2.01E-01	2.01E-01	6.73E-01	3.52E-01	1.23E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	4.80E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	8.95E+00	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-05	7.53E-03	7.55E-03				
Fluoranthene	8.40E+01	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-04	7.07E-02	7.09E-02				
Fluorene	4.00E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	3.37E-03	3.39E-03				
Naphthalene	2.43E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	2.04E-03	2.07E-03				
Phenanthrene	5.03E+01	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	4.23E-02	4.23E-02				
Total LMW PAHs						0.00E+00	3.95E-04	1.31E-01	1.31E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.18E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	3.51E-02	3.52E-02				
Benzo(A)Pyrene	5.05E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.25E-02	4.25E-02				
Benzo(b)fluoranthene	5.70E+01	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	4.80E-02	4.83E-02				
Benzo(g,h,i)perylene	4.20E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-04	3.53E-02	3.55E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	5.18E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	4.35E-02	4.38E-02				
Dibenz(A,H)Anthracene	1.00E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-06	8.41E-03	8.42E-03				
Indeno (1,2,3-CD) Pyrene	4.38E+01	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-05	3.68E-02	3.69E-02				
Pyrene	8.43E+01	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-04	7.09E-02	7.11E-02				
Total HMW PAHs						0.00E+00	1.06E-03	3.21E-01	3.22E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.56E+00	2.20E-02	0.00E+00	0.00E+00	3.64E-02	3.64E-02	6.61E-04	1.31E-03	3.84E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.63E-01	0.00E+00	0.00E+00	0.00E+00	2.19E-03	2.19E-03	0.00E+00	1.37E-04	2.33E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H1-10
Screening-Level Exposure Evaluation - North American Wolverine
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.58E-07	0.00E+00	0.00E+00	0.00E+00	2.26E-09	2.26E-09	0.00E+00	1.33E-10	2.39E-09				
1,2,3,7,8-PeCDD	9.30E-07	0.00E+00	0.00E+00	0.00E+00	1.58E-08	1.58E-08	0.00E+00	7.82E-10	1.66E-08				
1,2,3,4,7,8-HxCDD	2.40E-06	0.00E+00	0.00E+00	0.00E+00	4.49E-08	4.49E-09	0.00E+00	2.02E-10	4.69E-09				
1,2,3,6,7,8-HxCDD	1.07E-05	0.00E+00	0.00E+00	0.00E+00	2.32E-07	2.32E-08	0.00E+00	9.00E-10	2.41E-08				
1,2,3,7,8,9-HxCDD	5.99E-06	0.00E+00	0.00E+00	0.00E+00	1.23E-07	1.23E-08	0.00E+00	5.04E-10	1.28E-08				
1,2,3,4,6,7,8-HpCDD	3.36E-04	0.00E+00	0.00E+00	0.00E+00	1.03E-05	1.03E-07	0.00E+00	2.83E-09	1.06E-07				
OCDD	3.83E-03	0.00E+00	0.00E+00	0.00E+00	1.49E-04	4.47E-08	0.00E+00	9.66E-10	4.56E-08				
2,3,7,8-TCDF	2.69E-06	0.00E+00	0.00E+00	0.00E+00	1.01E-08	1.01E-09	0.00E+00	2.26E-10	1.24E-09				
1,2,3,7,8-PeCDF	1.58E-06	0.00E+00	0.00E+00	0.00E+00	5.94E-09	1.78E-10	0.00E+00	3.99E-11	2.18E-10				
2,3,4,7,8-PeCDF	1.92E-06	0.00E+00	0.00E+00	0.00E+00	7.22E-09	2.17E-09	0.00E+00	4.85E-10	2.65E-09				
1,2,3,4,7,8-HxCDF	7.23E-06	0.00E+00	0.00E+00	0.00E+00	2.72E-08	2.72E-09	0.00E+00	6.08E-10	3.33E-09				
1,2,3,6,7,8-HxCDF	2.16E-06	0.00E+00	0.00E+00	0.00E+00	8.12E-09	8.12E-10	0.00E+00	1.82E-10	9.94E-10				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	0.00E+00	0.00E+00	3.95E-10	3.95E-11	0.00E+00	8.83E-12	4.83E-11				
1,2,3,7,8,9-HxCDF	3.44E-06	0.00E+00	0.00E+00	0.00E+00	1.29E-08	1.29E-09	0.00E+00	2.89E-10	1.58E-09				
1,2,3,4,6,7,8-HpCDF	4.98E-05	0.00E+00	0.00E+00	0.00E+00	1.87E-07	1.87E-09	0.00E+00	4.19E-10	2.29E-09				
1,2,3,4,7,8,9-HpCDF	2.62E-06	0.00E+00	0.00E+00	0.00E+00	9.85E-09	9.85E-11	0.00E+00	2.20E-11	1.21E-10				
OCDF	1.24E-04	0.00E+00	0.00E+00	0.00E+00	4.66E-07	1.40E-10	0.00E+00	3.13E-11	1.71E-10				
Total Dioxins/Furans						2.16E-07	0.00E+00	8.63E-09	2.24E-07	5.62E-07	<1	3.76E-06	<1

Notes:

signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H1-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	4.20E-01	7.70E-03	0.00E+00	5.63E-02	0.00E+00	5.63E-02	1.03E-03	6.19E-04	5.79E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	8.10E+00	4.40E-03	0.00E+00	1.42E-01	0.00E+00	1.42E-01	5.90E-04	1.19E-02	1.54E-01	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-01	0.00E+00	3.63E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	8.75E-01	3.00E-03	0.00E+00	9.98E-01	0.00E+00	9.98E-01	4.02E-04	1.29E-03	1.00E+00	7.70E-01	1.30E+00	6.87E+00	<1
Chromium	3.53E+01	2.72E-02	0.00E+00	1.45E+00	0.00E+00	1.45E+00	3.65E-03	5.20E-02	1.50E+00	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-03	0.00E+00	2.08E-03	7.33E+00	<1	1.89E+01	<1
Copper	4.51E+01	1.83E-01	0.00E+00	3.11E+00	0.00E+00	3.11E+00	2.45E-02	6.65E-02	3.20E+00	5.60E+00	<1	8.27E+01	<1
Lead	3.82E+01	3.52E-02	0.00E+00	2.04E+00	0.00E+00	2.04E+00	4.72E-03	5.62E-02	2.10E+00	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-01	0.00E+00	5.03E-01	5.15E+01	<1	1.46E+02	<1
Mercury	2.20E-01	2.60E-04	0.00E+00	1.16E-01	0.00E+00	1.16E-01	3.48E-05	3.24E-04	1.16E-01	1.41E+00	<1	1.41E+01	<1
Nickel	9.27E+01	5.59E-02	0.00E+00	9.66E+00	0.00E+00	9.66E+00	7.49E-03	1.37E-01	9.80E+00	1.70E+00	5.77E+00	1.48E+01	<1
Selenium	5.70E-01	0.00E+00	0.00E+00	8.23E-02	0.00E+00	8.23E-02	0.00E+00	8.40E-04	8.32E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-05	0.00E+00	4.42E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.88E+01	2.48E-02	0.00E+00	1.62E-01	0.00E+00	1.62E-01	3.32E-03	4.24E-02	2.08E-01	4.16E+00	<1	9.44E+00	<1
Zinc	2.04E+02	5.37E-01	0.00E+00	6.56E+01	0.00E+00	6.56E+01	7.20E-02	3.01E-01	6.60E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.40E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	3.54E-03	5.42E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	4.18E+02	2.24E+01	0.00E+00	6.95E+00	0.00E+00	6.95E+00	3.00E+00	6.16E-01	1.06E+01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.70E+00	0.00E+00	0.00E+00	1.12E+00	0.00E+00	1.12E+00	0.00E+00	8.40E-03	1.13E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	8.95E+00	6.20E-04	0.00E+00	2.90E+00	0.00E+00	2.90E+00	8.31E-05	1.32E-02	2.92E+00				
Fluoranthene	8.40E+01	9.30E-03	0.00E+00	3.42E+01	0.00E+00	3.42E+01	1.25E-03	1.24E-01	3.43E+01				
Fluorene	4.00E+00	8.70E-04	0.00E+00	5.13E+00	0.00E+00	5.13E+00	1.17E-04	5.90E-03	5.14E+00				
Naphthalene	2.43E+00	8.70E-04	0.00E+00	1.43E+00	0.00E+00	1.43E+00	1.17E-04	3.57E-03	1.43E+00				
Phenanthrene	5.03E+01	1.50E-03	0.00E+00	1.16E+01	0.00E+00	1.16E+01	2.01E-04	7.41E-02	1.17E+01				
Total LMW PAHs						5.64E+01	1.76E-03	2.29E-01	5.66E+01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.18E+01	3.00E-03	0.00E+00	8.90E+00	0.00E+00	8.90E+00	4.02E-04	6.15E-02	8.96E+00				
Benzo[A]Pyrene	5.05E+01	0.00E+00	0.00E+00	9.00E+00	0.00E+00	9.00E+00	0.00E+00	7.44E-02	9.08E+00				
Benzo(b)fluoranthene	5.70E+01	1.00E-02	0.00E+00	1.99E+01	0.00E+00	1.99E+01	1.34E-03	8.40E-02	1.99E+01				
Benzo(g,h,i)perylene	4.20E+01	3.90E-03	0.00E+00	1.65E+01	0.00E+00	1.65E+01	5.23E-04	6.19E-02	1.66E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	5.18E+01	7.60E-03	0.00E+00	1.59E+01	0.00E+00	1.59E+01	1.02E-03	7.63E-02	1.60E+01				
Dibenz(A,H)Anthracene	1.00E+01	9.80E-05	0.00E+00	3.10E+00	0.00E+00	3.10E+00	1.31E-05	1.47E-02	3.11E+00				
Indeno (1,2,3-CD) Pyrene	4.38E+01	3.10E-03	0.00E+00	1.68E+01	0.00E+00	1.68E+01	4.15E-04	6.45E-02	1.68E+01				
Pyrene	8.43E+01	7.00E-03	0.00E+00	1.98E+01	0.00E+00	1.98E+01	9.38E-04	1.24E-01	1.99E+01				
Total HMW PAHs						1.10E+02	4.71E-03	5.62E-01	1.10E+02	6.15E-01	1.79E+02	3.84E+01	2.87E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.56E+00	2.20E-02	0.00E+00	1.13E+01	0.00E+00	1.13E+01	2.95E-03	2.29E-03	1.13E+01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.63E-01	0.00E+00	0.00E+00	2.25E-01	0.00E+00	2.25E-01	0.00E+00	2.40E-04	2.25E-01	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H1-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.58E-07	0.00E+00	0.00E+00	4.19E-08	0.00E+00	4.19E-08	0.00E+00	2.33E-10	4.21E-08				
1,2,3,7,8-PeCDD	9.30E-07	0.00E+00	0.00E+00	3.41E-07	0.00E+00	3.41E-07	0.00E+00	1.37E-09	3.42E-07				
1,2,3,4,7,8-HxCDD	2.40E-06	0.00E+00	0.00E+00	1.04E-06	0.00E+00	1.04E-07	0.00E+00	3.54E-10	1.05E-07				
1,2,3,6,7,8-HxCDD	1.07E-05	0.00E+00	0.00E+00	6.11E-06	0.00E+00	6.11E-07	0.00E+00	1.58E-09	6.13E-07				
1,2,3,7,8,9-HxCDD	5.99E-06	0.00E+00	0.00E+00	3.08E-06	0.00E+00	3.08E-07	0.00E+00	8.83E-10	3.09E-07				
1,2,3,4,6,7,8-HpCDD	3.36E-04	0.00E+00	0.00E+00	3.59E-04	0.00E+00	3.59E-06	0.00E+00	4.95E-09	3.60E-06				
OCDD	3.83E-03	0.00E+00	0.00E+00	6.38E-03	0.00E+00	1.91E-06	0.00E+00	1.69E-09	1.91E-06				
2,3,7,8-TCDF	2.69E-06	0.00E+00	0.00E+00	1.20E-06	0.00E+00	1.20E-07	0.00E+00	3.97E-10	1.20E-07				
1,2,3,7,8-PeCDF	1.58E-06	0.00E+00	0.00E+00	6.37E-07	0.00E+00	1.91E-08	0.00E+00	6.99E-11	1.92E-08				
2,3,4,7,8-PeCDF	1.92E-06	0.00E+00	0.00E+00	8.02E-07	0.00E+00	2.41E-07	0.00E+00	8.49E-10	2.42E-07				
1,2,3,4,7,8-HxCDF	7.23E-06	0.00E+00	0.00E+00	3.85E-06	0.00E+00	3.85E-07	0.00E+00	1.07E-09	3.86E-07				
1,2,3,6,7,8-HxCDF	2.16E-06	0.00E+00	0.00E+00	9.22E-07	0.00E+00	9.22E-08	0.00E+00	3.18E-10	9.25E-08				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	0.00E+00	2.59E-08	0.00E+00	2.59E-09	0.00E+00	1.55E-11	2.60E-09				
1,2,3,7,8,9-HxCDF	3.44E-06	0.00E+00	0.00E+00	1.60E-06	0.00E+00	1.60E-07	0.00E+00	5.07E-10	1.60E-07				
1,2,3,4,6,7,8-HpCDF	4.98E-05	0.00E+00	0.00E+00	3.76E-05	0.00E+00	3.76E-07	0.00E+00	7.34E-10	3.77E-07				
1,2,3,4,7,8,9-HpCDF	2.62E-06	0.00E+00	0.00E+00	1.16E-06	0.00E+00	1.16E-08	0.00E+00	3.86E-11	1.16E-08				
OCDF	1.24E-04	0.00E+00	0.00E+00	1.11E-04	0.00E+00	3.32E-08	0.00E+00	5.48E-11	3.32E-08				
Total Dioxins/Furans						8.35E-06	0.00E+00	1.51E-08	8.37E-06	5.62E-07	1.49E+01	3.76E-06	2.23E+00

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H2-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.18E+01	3.75E-02	4.43E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.38E+00	Sample et al. (1999)	Regression ^f	5.92E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	4.20E+02	1.56E-01	6.55E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	3.82E+01	Sample et al. (1998a)	6.83E-04	2.87E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	1.50E+00	Regression ^a	7.88E-01	USEPA (2007)	4.50E-02	6.75E-02	Sample et al. (1998a)	2.25E-03	3.38E-03	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.72E-02	8.48E+01	4.10E-02	3.48E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	2.59E+01	Sample et al. (1998a)	Regression ^f	6.04E+00	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	7.26E+03	Regression ^a	6.48E+01	Bechtel-Jacobs (1998a)	5.15E-01	3.74E+03	Sample et al. (1998a)	Regression ^f	2.78E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	4.80E+01	Regression ^a	2.33E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.83E+01	Sample et al. (1999)	Regression ^f	5.98E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	1.14E+03	7.90E-02	9.01E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	5.41E+01	Sample et al. (1999)	2.05E-02	2.34E+01	Sample et al. (1998b) ^j
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	8.90E+01	Regression ^a	3.11E+00	Bechtel-Jacobs (1998a)	7.78E-01	6.92E+01	Sample et al. (1998a)	Regression ^f	6.33E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	1.20E+00	Regression ^a	6.21E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.06E+00	Sample et al. (1998a)	Regression ^f	7.07E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.40E-01	4.00E-03	5.60E-04	Baes et al. (1984)	5.41E-02	7.57E-03	USCHPPM (2004)	1.08E-01	1.51E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	2.77E+01	4.85E-03	1.34E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	1.16E+00	Sample et al. (1998a)	1.23E-02	3.41E-01	Sample et al. (1998b) ^j
Zinc	NA	5.37E-01	1.14E+02	Regression ^a	6.66E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.04E+02	Sample et al. (1998a)	Regression ^f	1.10E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	9.90E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	7.96E+02	6.00E-02	4.78E+01	Baes et al. (1984)	1.24E-01	9.87E+01	USCHPPM (2004)	1.60E-02	1.27E+01	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	0.00E+00	1.20E+00	8.90E-02	1.07E-01	USEPA (2007a)	2.92E+01	3.51E+01	USEPA (2007a)	2.53E-01	3.03E-01	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:		0.00E+00										
Acenaphthene	3.92	0.00E+00	2.20E+01	Regression ^a	2.73E-04	USEPA (2007a)	1.47E+00	3.23E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	4.70E+01	Regression ^a	7.45E+00	USEPA (2007a)	2.42E+00	1.14E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	2.40E+02	5.00E-01	1.20E+02	USEPA (2007a)	3.04E+00	7.30E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	1.90E+01	Regression ^a	3.09E-04	USEPA (2007a)	9.57E+00	1.82E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	4.60E+00	1.22E+01	5.61E+01	USEPA (2007a)	4.40E+00	2.02E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	1.80E+02	Regression ^a	2.12E+01	USEPA (2007a)	1.72E+00	3.10E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:		0.00E+00										
Benzo(a)anthracene	5.7	3.00E-03	1.00E+02	Regression ^a	1.03E+00	USEPA (2007a)	1.59E+00	1.59E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	1.00E+02	Regression ^a	1.13E+01	USEPA (2007a)	1.33E+00	1.33E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	1.20E+02	3.10E-01	3.72E+01	USEPA (2007a)	2.60E+00	3.12E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	6.20E+01	Regression ^a	5.20E+01	USEPA (2007a)	2.94E+00	1.82E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	1.10E+02	Regression ^a	1.09E+00	USEPA (2007a)	2.29E+00	2.52E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	2.10E+01	1.30E-01	2.73E+00	USEPA (2007a)	2.31E+00	4.85E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H2-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	7.60E+01	1.10E-01	8.36E+00	USEPA (2007a)	2.86E+00	2.17E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	1.50E+02	7.20E-01	1.08E+02	USEPA (2007a)	1.75E+00	2.63E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	2.50E+00	2.38E-02	5.95E-02	USEPA (2007a)	5.44E+01	1.36E+02	USEPA (2007a)	7.79E-01	1.95E+00	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	1.00E+01	1.88E+00	1.88E+01	USEPA (2007a)	6.96E+00	6.96E+01	USEPA (2007a)	5.60E-02	5.60E-01	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	5.60E-02	8.14E-01	4.56E-02	USEPA (2007a)	1.03E+01	5.78E-01	USEPA (2007a)	4.49E-01	2.51E-02	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	2.70E-07	9.41E-02	2.54E-08	USEPA (2007a) ^b	Regression ^d	5.89E-07	Sample et al. (1998a)	Regression ^h	1.35E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	3.20E-07	5.17E-02	1.66E-08	USEPA (2007a) ^b	Regression ^d	7.20E-07	Sample et al. (1998a)	Regression ^h	1.63E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	2.46E-06	2.82E-02	6.94E-08	USEPA (2007a) ^b	Regression ^d	8.03E-06	Sample et al. (1998a)	Regression ^h	1.54E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	1.14E-06	2.82E-02	3.21E-08	USEPA (2007a) ^b	Regression ^d	3.23E-06	Sample et al. (1998a)	Regression ^h	6.59E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	7.63E-05	1.55E-02	1.18E-06	USEPA (2007a) ^b	Regression ^d	4.65E-04	Sample et al. (1998a)	Regression ^h	6.70E-05	Sample et al. (1998b)
OCDD	9.50	0.00E+00	8.91E-04	8.45E-03	7.53E-06	USEPA (2007a) ^b	Regression ^d	8.49E-03	Sample et al. (1998a)	Regression ^h	9.98E-04	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	1.78E-06	1.69E-01	3.02E-07	USEPA (2007a) ^b	Regression ^d	5.47E-06	Sample et al. (1998a)	1.25E-01	2.23E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
2,3,4,7,8-PeCDF	6.94	0.00E+00	9.50E-07	9.24E-02	8.77E-08	USEPA (2007a) ^b	Regression ^d	2.61E-06	Sample et al. (1998a)	1.25E-01	1.19E-07	Sample et al. (1998b) ^j
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	1.67E-06	3.70E-02	6.17E-08	USEPA (2007a) ^b	Regression ^d	5.08E-06	Sample et al. (1998a)	1.25E-01	2.09E-07	Sample et al. (1998b) ^j
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.80E-07	3.70E-02	2.88E-08	USEPA (2007a) ^b	Regression ^d	2.06E-06	Sample et al. (1998a)	1.25E-01	9.76E-08	Sample et al. (1998b) ^j
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	5.70E-07	5.08E-02	2.90E-08	USEPA (2007a) ^b	Regression ^d	1.42E-06	Sample et al. (1998a)	1.25E-01	7.13E-08	Sample et al. (1998b) ^j
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	5.37E-06	2.77E-02	1.49E-07	USEPA (2007a) ^b	Regression ^d	2.02E-05	Sample et al. (1998a)	1.25E-01	6.72E-07	Sample et al. (1998b) ^j
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
OCDF	8.87	0.00E+00	1.68E-05	1.52E-02	2.56E-07	USEPA (2007a) ^b	Regression ^d	7.77E-05	Sample et al. (1998a)	1.25E-01	2.10E-06	Sample et al. (1998b) ^j

Table H2-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors- Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	0.544	-0.996	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H2-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.45E+01	3.75E-02	5.45E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.60E+00	Sample et al. (1999)	Regression ^f	7.02E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	4.31E+02	1.56E-01	6.72E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	3.92E+01	Sample et al. (1998a)	6.83E-04	2.94E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	3.62E+00	Regression ^a	1.51E+00	USEPA (2007)	4.50E-02	1.63E-01	Sample et al. (1998a)	2.25E-03	8.15E-03	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.72E-02	2.87E+01	4.10E-02	1.18E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	8.78E+00	Sample et al. (1998a)	Regression ^f	2.73E+00	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	1.84E+03	Regression ^a	3.77E+01	Bechtel-Jacobs (1998a)	5.15E-01	9.48E+02	Sample et al. (1998a)	Regression ^f	2.28E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	4.96E+01	Regression ^a	2.37E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.88E+01	Sample et al. (1999)	Regression ^f	6.07E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	1.03E+03	7.90E-02	8.11E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	5.04E+01	Sample et al. (1999)	2.05E-02	2.10E+01	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	4.04E+02	Regression ^a	9.64E+00	Bechtel-Jacobs (1998a)	7.78E-01	3.14E+02	Sample et al. (1998a)	Regression ^f	1.28E+01	Sample et al. (1998b)
Selenium	NA	2.00E-03	2.29E+00	Regression ^a	1.27E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.70E+00	Sample et al. (1998a)	Regression ^f	9.01E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	8.41E-01	4.00E-03	3.37E-03	Baes et al. (1984)	5.41E-02	4.55E-02	USCHPPM (2004)	1.08E-01	9.10E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	1.15E+02	4.85E-03	5.59E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	4.84E+00	Sample et al. (1998a)	1.23E-02	1.42E+00	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	1.12E+02	Regression ^a	6.59E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.02E+02	Sample et al. (1998a)	Regression ^f	1.10E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	1.22E+01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	6.03E+02	6.00E-02	3.62E+01	Baes et al. (1984)	1.24E-01	7.47E+01	USCHPPM (2004)	1.60E-02	9.64E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	9.83E-01	8.90E-02	8.74E-02	USEPA (2007a)	2.92E+01	2.87E+01	USEPA (2007a)	2.53E-01	2.48E-01	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:		0.00E+00										
Acenaphthene	3.92	0.00E+00	2.65E+01	Regression ^a	2.33E-04	USEPA (2007a)	1.47E+00	3.90E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	4.78E+01	Regression ^a	7.54E+00	USEPA (2007a)	2.42E+00	1.16E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	2.40E+02	5.00E-01	1.20E+02	USEPA (2007a)	3.04E+00	7.30E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	2.35E+01	Regression ^a	2.58E-04	USEPA (2007a)	9.57E+00	2.25E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	8.65E+00	1.22E+01	1.06E+02	USEPA (2007a)	4.40E+00	3.81E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	2.25E+02	Regression ^a	2.44E+01	USEPA (2007a)	1.72E+00	3.87E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:		0.00E+00										
Benzo(a)anthracene	5.7	3.00E-03	9.18E+01	Regression ^a	9.79E-01	USEPA (2007a)	1.59E+00	1.46E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	8.13E+01	Regression ^a	9.26E+00	USEPA (2007a)	1.33E+00	1.08E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	1.05E+02	3.10E-01	3.26E+01	USEPA (2007a)	2.60E+00	2.73E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	5.08E+01	Regression ^a	4.10E+01	USEPA (2007a)	2.94E+00	1.49E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	1.10E+02	Regression ^a	1.09E+00	USEPA (2007a)	2.29E+00	2.52E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	1.95E+01	1.30E-01	2.54E+00	USEPA (2007a)	2.31E+00	4.50E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H2-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	6.18E+01	1.10E-01	6.79E+00	USEPA (2007a)	2.86E+00	1.77E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	1.35E+02	7.20E-01	9.72E+01	USEPA (2007a)	1.75E+00	2.36E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	6.39E-01	2.38E-02	1.52E-02	USEPA (2007a)	5.44E+01	3.48E+01	USEPA (2007a)	7.79E-01	4.98E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	1.38E+01	1.88E+00	2.58E+01	USEPA (2007a)	6.96E+00	9.57E+01	USEPA (2007a)	5.60E-02	7.70E-01	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	4.15E-02	8.14E-01	3.38E-02	USEPA (2007a)	1.03E+01	4.28E-01	USEPA (2007a)	4.49E-01	1.86E-02	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	2.70E-07	9.41E-02	2.54E-08	USEPA (2007a) ^b	Regression ^d	5.89E-07	Sample et al. (1998a)	Regression ^h	1.35E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	3.20E-07	5.17E-02	1.66E-08	USEPA (2007a) ^b	Regression ^d	7.20E-07	Sample et al. (1998a)	Regression ^h	1.63E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	2.46E-06	2.82E-02	6.94E-08	USEPA (2007a) ^b	Regression ^d	8.03E-06	Sample et al. (1998a)	Regression ^h	1.54E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	1.14E-06	2.82E-02	3.21E-08	USEPA (2007a) ^b	Regression ^d	3.23E-06	Sample et al. (1998a)	Regression ^h	6.59E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	7.63E-05	1.55E-02	1.18E-06	USEPA (2007a) ^b	Regression ^d	4.65E-04	Sample et al. (1998a)	Regression ^h	6.70E-05	Sample et al. (1998b)
OCDD	9.50	0.00E+00	8.91E-04	8.45E-03	7.53E-06	USEPA (2007a) ^b	Regression ^d	8.49E-03	Sample et al. (1998a)	Regression ^h	9.98E-04	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	1.78E-06	1.69E-01	3.02E-07	USEPA (2007a) ^b	Regression ^d	5.47E-06	Sample et al. (1998a)	1.25E-01	2.23E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	9.50E-07	9.24E-02	8.77E-08	USEPA (2007a) ^b	Regression ^d	2.61E-06	Sample et al. (1998a)	1.25E-01	1.19E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	1.67E-06	3.70E-02	6.17E-08	USEPA (2007a) ^b	Regression ^d	5.08E-06	Sample et al. (1998a)	1.25E-01	2.09E-07	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.80E-07	3.70E-02	2.88E-08	USEPA (2007a) ^b	Regression ^d	2.06E-06	Sample et al. (1998a)	1.25E-01	9.76E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	5.70E-07	5.08E-02	2.90E-08	USEPA (2007a) ^b	Regression ^d	1.42E-06	Sample et al. (1998a)	1.25E-01	7.13E-08	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	5.37E-06	2.77E-02	1.49E-07	USEPA (2007a) ^b	Regression ^d	2.02E-05	Sample et al. (1998a)	1.25E-01	6.72E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	1.68E-05	1.52E-02	2.56E-07	USEPA (2007a) ^b	Regression ^d	7.77E-05	Sample et al. (1998a)	1.25E-01	2.10E-06	Sample et al. (1998b) ⁱ

Table H2-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H2-2
Screening-Level Exposure Evaluation - American Woodcock
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-04	0.00E+00	9.05E-04	No TRV	--	No TRV	--
Arsenic	1.18E+01	4.40E-03	5.20E-03	1.46E-01	0.00E+00	1.51E-01	5.17E-04	1.04E-01	2.56E-01	2.24E+00	<1	4.51E+00	<1
Barium	4.20E+02	2.71E+00	7.70E-01	4.04E+00	0.00E+00	4.81E+00	3.18E-01	3.70E+00	8.83E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	1.50E+00	1.50E-03	9.26E-03	7.14E-03	0.00E+00	1.64E-02	1.76E-04	1.32E-02	2.98E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-04	0.00E+00	3.52E-04	1.47E+00	<1	6.35E+00	<1
Chromium	8.48E+01	2.72E-02	4.08E-02	2.74E+00	0.00E+00	2.78E+00	3.20E-03	7.47E-01	3.53E+00	2.66E+00	1.33E+00	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-03	0.00E+00	1.82E-03	7.61E+00	<1	2.02E+01	<1
Copper	7.26E+03	1.83E-01	7.61E-01	3.95E+02	0.00E+00	3.96E+02	2.15E-02	6.40E+01	4.60E+02	4.05E+00	1.14E+02	3.48E+01	1.32E+01
Lead	4.80E+01	3.52E-02	2.73E-02	1.93E+00	0.00E+00	1.96E+00	4.14E-03	4.23E-01	2.39E+00	1.63E+00	1.46E+00	4.46E+01	<1
Manganese	1.14E+03	3.75E+00	1.06E+00	5.72E+00	0.00E+00	6.78E+00	4.41E-01	1.00E+01	1.73E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.05E-05	--	3.05E-05	4.50E-01	<1	9.10E-01	<1
Nickel	8.90E+01	5.59E-02	3.65E-02	7.32E+00	0.00E+00	7.36E+00	6.57E-03	7.84E-01	8.15E+00	6.71E+00	1.21E+00	1.86E+01	<1
Selenium	1.20E+00	2.00E-03	7.30E-03	1.12E-01	0.00E+00	1.19E-01	2.35E-04	1.06E-02	1.30E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.40E-01	3.30E-04	6.58E-06	8.01E-04	0.00E+00	8.07E-04	3.88E-05	1.23E-03	2.08E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.77E+01	2.48E-02	1.58E-03	1.23E-01	0.00E+00	1.25E-01	2.91E-03	2.44E-01	3.72E-01	3.44E-01	1.08E+00	1.70E+00	<1
Zinc	1.14E+02	5.37E-01	7.83E-01	4.28E+01	0.00E+00	4.35E+01	6.31E-02	1.00E+00	4.46E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	8.72E-02	1.32E-01	4.00E-02	3.29E+00	4.00E-01	<1
Fluoride	7.96E+02	2.24E+01	5.61E-01	1.04E+01	0.00E+00	1.10E+01	2.63E+00	7.01E+00	2.06E+01	1.22E+01	1.69E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	1.25E-03	3.71E+00	0.00E+00	3.71E+00	0.00E+00	1.06E-02	3.72E+00	1.80E-01	2.07E+01	1.80E+00	2.07E+00
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.20E+01	0.00E+00	3.21E-06	3.42E+00	0.00E+00	3.42E+00	0.00E+00	1.94E-01	3.61E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	8.75E-02	1.20E+01	0.00E+00	1.21E+01	7.28E-05	4.14E-01	1.25E+01				
Fluoranthene	2.40E+02	9.30E-03	1.41E+00	7.71E+01	0.00E+00	7.86E+01	1.09E-03	2.11E+00	8.07E+01				
Fluorene	1.90E+01	8.70E-04	3.63E-06	1.92E+01	0.00E+00	1.92E+01	1.02E-04	1.67E-01	1.94E+01				
Naphthalene	4.60E+00	8.70E-04	6.59E-01	2.14E+00	0.00E+00	2.80E+00	1.02E-04	4.05E-02	2.84E+00				
Phenanthrene	1.80E+02	1.50E-03	2.49E-01	3.27E+01	0.00E+00	3.30E+01	1.76E-04	1.59E+00	3.46E+01				
Total LMW PAHs						1.49E+02	1.55E-03	4.52E+00	1.54E+02	1.61E+01	9.54E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+02	3.00E-03	1.21E-02	1.68E+01	0.00E+00	1.68E+01	3.52E-04	8.81E-01	1.77E+01				
Benzo[A]Pyrene	1.00E+02	0.00E+00	1.33E-01	1.41E+01	0.00E+00	1.42E+01	0.00E+00	8.81E-01	1.51E+01				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	4.37E-01	3.30E+01	0.00E+00	3.34E+01	1.17E-03	1.06E+00	3.45E+01				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	6.11E-01	1.93E+01	0.00E+00	1.99E+01	4.58E-04	5.46E-01	2.04E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	1.10E+02	7.60E-03	1.28E-02	2.66E+01	0.00E+00	2.66E+01	8.93E-04	9.69E-01	2.76E+01				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	3.21E-02	5.13E+00	0.00E+00	5.16E+00	1.15E-05	1.85E-01	5.35E+00				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	9.82E-02	2.30E+01	0.00E+00	2.31E+01	3.64E-04	6.70E-01	2.38E+01				
Pyrene	1.50E+02	7.00E-03	1.27E+00	2.78E+01	0.00E+00	2.90E+01	8.22E-04	1.32E+00	3.03E+01				
Total HMW PAHs						1.68E+02	4.13E-03	6.51E+00	1.75E+02	2.00E+00	8.74E+01	2.00E+01	8.74E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	6.99E-04	1.44E+01	0.00E+00	1.44E+01	2.58E-03	2.20E-02	1.44E+01	1.10E+00	1.31E+01	1.10E+01	1.31E+00
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.00E+01	0.00E+00	2.21E-01	7.36E+00	0.00E+00	7.58E+00	0.00E+00	8.81E-02	7.66E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	5.36E-04	6.11E-02	0.00E+00	6.16E-02	0.00E+00	4.93E-04	6.21E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H2-2
Screening-Level Exposure Evaluation - American Woodcock
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	2.98E-10	6.23E-08	0.00E+00	6.26E-08	0.00E+00	2.38E-09	6.50E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	1.95E-10	7.61E-08	0.00E+00	7.63E-08	0.00E+00	2.82E-09	7.92E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	8.15E-10	8.49E-07	0.00E+00	8.49E-09	0.00E+00	2.17E-10	8.71E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	3.78E-10	3.42E-07	0.00E+00	3.42E-08	0.00E+00	1.00E-09	3.52E-08				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.39E-08	4.92E-05	0.00E+00	4.92E-08	0.00E+00	6.72E-10	4.99E-08				
OCDD	8.91E-04	0.00E+00	8.84E-08	8.98E-04	0.00E+00	8.98E-08	0.00E+00	7.85E-10	9.06E-08				
2,3,7,8-TCDF	1.78E-06	0.00E+00	3.54E-09	5.79E-07	0.00E+00	5.82E-07	0.00E+00	1.57E-08	5.98E-07				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.03E-09	2.76E-07	0.00E+00	2.77E-07	0.00E+00	8.37E-09	2.85E-07				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	7.25E-10	5.37E-07	0.00E+00	5.38E-08	0.00E+00	1.47E-09	5.52E-08				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	3.39E-10	2.18E-07	0.00E+00	2.19E-08	0.00E+00	6.87E-10	2.25E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	3.40E-10	1.51E-07	0.00E+00	1.51E-08	0.00E+00	5.02E-10	1.56E-08				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	1.75E-09	2.14E-06	0.00E+00	2.14E-08	0.00E+00	4.73E-10	2.18E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	3.00E-09	8.22E-06	0.00E+00	8.22E-10	0.00E+00	1.48E-11	8.37E-10				
Total Dioxins/Furans						1.29E-06	0.00E+00	3.51E-08	1.33E-06	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-3
Screening-Level Exposure Evaluation - Mourning Dove
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.79E-04	0.00E+00	8.79E-04	No TRV	--	No TRV	--
Arsenic	1.18E+01	4.40E-03	5.05E-02	0.00E+00	0.00E+00	5.05E-02	5.02E-04	9.16E-02	1.43E-01	2.24E+00	<1	4.51E+00	<1
Barium	4.20E+02	2.71E+00	7.48E+00	0.00E+00	0.00E+00	7.48E+00	3.09E-01	3.26E+00	1.10E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	1.50E+00	1.50E-03	8.99E-02	0.00E+00	0.00E+00	8.99E-02	1.71E-04	1.16E-02	1.02E-01	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-04	0.00E+00	3.42E-04	1.47E+00	<1	6.35E+00	<1
Chromium	8.48E+01	2.72E-02	3.97E-01	0.00E+00	0.00E+00	3.97E-01	3.10E-03	6.58E-01	1.06E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	0.00E+00	1.77E-03	7.61E+00	<1	2.02E+01	<1
Copper	7.26E+03	1.83E-01	7.39E+00	0.00E+00	0.00E+00	7.39E+00	2.09E-02	5.63E+01	6.38E+01	4.05E+00	1.57E+01	3.48E+01	1.83E+00
Lead	4.80E+01	3.52E-02	2.65E-01	0.00E+00	0.00E+00	2.65E-01	4.02E-03	3.73E-01	6.42E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.14E+03	3.75E+00	1.03E+01	0.00E+00	0.00E+00	1.03E+01	4.28E-01	8.85E+00	1.96E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05	4.50E-01	<1	9.10E-01	<1
Nickel	8.90E+01	5.59E-02	3.55E-01	0.00E+00	0.00E+00	3.55E-01	6.38E-03	6.91E-01	1.05E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.20E+00	2.00E-03	7.09E-02	0.00E+00	0.00E+00	7.09E-02	2.28E-04	9.31E-03	8.05E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.40E-01	3.30E-04	6.39E-05	0.00E+00	0.00E+00	6.39E-05	3.77E-05	1.09E-03	1.19E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.77E+01	2.48E-02	1.53E-02	0.00E+00	0.00E+00	1.53E-02	2.83E-03	2.15E-01	2.33E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.14E+02	5.37E-01	7.60E+00	0.00E+00	0.00E+00	7.60E+00	6.13E-02	8.85E-01	8.55E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	7.68E-02	1.20E-01	4.00E-02	3.00E+00	4.00E-01	<1
Fluoride	7.96E+02	2.24E+01	5.45E+00	0.00E+00	0.00E+00	5.45E+00	2.56E+00	6.18E+00	1.42E+01	1.22E+01	1.16E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	1.22E-02	0.00E+00	0.00E+00	1.22E-02	0.00E+00	9.31E-03	2.15E-02	1.80E-01	<1	1.80E+00	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.20E+01	0.00E+00	3.11E-05	0.00E+00	0.00E+00	3.11E-05	0.00E+00	1.71E-01	1.71E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	8.50E-01	0.00E+00	0.00E+00	8.50E-01	8.50E-05	3.65E-01	7.08E-05	1.22E+00			
Fluoranthene	2.40E+02	9.30E-03	1.37E+01	0.00E+00	0.00E+00	1.37E+01	1.06E-03	1.86E+00	1.56E+01				
Fluorene	1.90E+01	8.70E-04	3.53E-05	0.00E+00	0.00E+00	3.53E-05	9.93E-05	1.47E-01	1.48E-01				
Naphthalene	4.60E+00	8.70E-04	6.41E+00	0.00E+00	0.00E+00	6.41E+00	9.93E-05	3.57E-02	6.44E+00				
Phenanthrene	1.80E+02	1.50E-03	2.42E+00	0.00E+00	0.00E+00	2.42E+00	1.71E-04	1.40E+00	3.82E+00				
Total LMW PAHs						2.34E+01	1.50E-03	3.98E+00	2.74E+01	1.61E+01	1.70E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+02	3.00E-03	1.18E-01	0.00E+00	0.00E+00	1.18E-01	3.42E-04	7.76E-01	8.94E-01				
Benzo[A]Pyrene	1.00E+02	0.00E+00	1.29E+00	0.00E+00	0.00E+00	1.29E+00	0.00E+00	7.76E-01	2.07E+00				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	4.25E+00	0.00E+00	0.00E+00	4.25E+00	1.14E-03	9.31E-01	5.18E+00				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	5.93E+00	0.00E+00	0.00E+00	5.93E+00	4.45E-04	4.81E-01	6.41E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	1.10E+02	7.60E-03	1.24E-01	0.00E+00	0.00E+00	1.24E-01	8.67E-04	8.54E-01	9.79E-01				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	3.12E-01	0.00E+00	0.00E+00	3.12E-01	1.12E-05	1.63E-01	4.75E-01				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	9.54E-01	0.00E+00	0.00E+00	9.54E-01	3.54E-04	5.90E-01	1.54E+00				
Pyrene	1.50E+02	7.00E-03	1.23E+01	0.00E+00	0.00E+00	1.23E+01	7.99E-04	1.16E+00	1.35E+01				
Total HMW PAHs						2.53E+01	4.01E-03	5.74E+00	3.10E+01	2.00E+00	1.55E+01	2.00E+01	1.55E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	6.79E-03	0.00E+00	0.00E+00	6.79E-03	2.51E-03	1.94E-02	2.87E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.00E+01	0.00E+00	2.14E+00	0.00E+00	0.00E+00	2.14E+00	0.00E+00	7.76E-02	2.22E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	5.20E-03	0.00E+00	0.00E+00	5.20E-03	0.00E+00	4.35E-04	5.64E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H2-3
Screening-Level Exposure Evaluation - Mourning Dove
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	2.90E-09	0.00E+00	0.00E+00	2.90E-09	0.00E+00	2.10E-09	5.00E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	1.89E-09	0.00E+00	0.00E+00	1.89E-09	0.00E+00	2.48E-09	4.37E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	7.92E-09	0.00E+00	0.00E+00	7.92E-11	0.00E+00	1.91E-10	2.70E-10				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	3.67E-09	0.00E+00	0.00E+00	3.67E-10	0.00E+00	8.85E-10	1.25E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.35E-07	0.00E+00	0.00E+00	1.35E-10	0.00E+00	5.92E-10	7.27E-10				
OCDD	8.91E-04	0.00E+00	8.59E-07	0.00E+00	0.00E+00	8.59E-11	0.00E+00	6.92E-10	7.77E-10				
2,3,7,8-TCDF	1.78E-06	0.00E+00	3.44E-08	0.00E+00	0.00E+00	3.44E-08	0.00E+00	1.38E-08	4.83E-08				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.00E-08	0.00E+00	0.00E+00	1.00E-08	0.00E+00	7.37E-09	1.74E-08				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	7.05E-09	0.00E+00	0.00E+00	7.05E-10	0.00E+00	1.30E-09	2.00E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	3.29E-09	0.00E+00	0.00E+00	3.29E-10	0.00E+00	6.05E-10	9.35E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	3.30E-09	0.00E+00	0.00E+00	3.30E-10	0.00E+00	4.42E-10	7.73E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	1.70E-08	0.00E+00	0.00E+00	1.70E-10	0.00E+00	4.17E-10	5.86E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	2.92E-08	0.00E+00	0.00E+00	2.92E-12	0.00E+00	1.30E-11	1.60E-11				
Total Dioxins/Furans						5.14E-08	0.00E+00	3.09E-08	8.23E-08	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.31E-04	0.00E+00	6.31E-04	No TRV	--	No TRV	--
Arsenic	1.18E+01	4.40E-03	0.00E+00	0.00E+00	4.86E-03	4.86E-03	3.61E-04	2.52E-02	3.04E-02	2.24E+00	<1	4.51E+00	<1
Barium	4.20E+02	2.71E+00	0.00E+00	0.00E+00	2.35E-02	2.35E-02	2.22E-01	8.96E-01	1.14E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	1.50E+00	1.50E-03	0.00E+00	0.00E+00	2.77E-04	2.77E-04	1.23E-04	3.20E-03	3.60E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	0.00E+00	2.46E-04	1.47E+00	<1	6.35E+00	<1
Chromium	8.48E+01	2.72E-02	0.00E+00	0.00E+00	4.95E-01	4.95E-01	2.23E-03	1.81E-01	6.78E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	0.00E+00	1.27E-03	7.61E+00	<1	2.02E+01	<1
Copper	7.26E+03	1.83E-01	0.00E+00	0.00E+00	2.28E+00	2.28E+00	1.50E-02	1.55E+01	1.78E+01	4.05E+00	4.39E+00	3.48E+01	<1
Lead	4.80E+01	3.52E-02	0.00E+00	0.00E+00	4.90E-01	4.90E-01	2.89E-03	1.02E-01	5.95E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.14E+03	3.75E+00	0.00E+00	0.00E+00	1.92E+00	1.92E+00	3.08E-01	2.43E+00	4.65E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.13E-05	--	2.13E-05	4.50E-01	<1	9.10E-01	<1
Nickel	8.90E+01	5.59E-02	0.00E+00	0.00E+00	5.19E-01	5.19E-01	4.58E-03	1.90E-01	7.13E-01	6.71E+00	<1	1.86E+01	<1
Selenium	1.20E+00	2.00E-03	0.00E+00	0.00E+00	5.80E-02	5.80E-02	1.64E-04	2.56E-03	6.07E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.40E-01	3.30E-04	0.00E+00	0.00E+00	1.24E-03	1.24E-03	2.71E-05	2.99E-04	1.57E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.77E+01	2.48E-02	0.00E+00	0.00E+00	2.79E-02	2.79E-02	2.03E-03	5.91E-02	8.90E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.14E+02	5.37E-01	0.00E+00	0.00E+00	8.99E+00	8.99E+00	4.40E-02	2.43E-01	9.28E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	2.11E-02	5.21E-02	4.00E-02	1.30E+00	4.00E-01	<1
Fluoride	7.96E+02	2.24E+01	0.00E+00	0.00E+00	1.04E+00	1.04E+00	1.84E+00	1.70E+00	4.58E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-02	2.49E-02	0.00E+00	2.56E-03	2.74E-02	1.80E-01	<1	1.80E+00	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-02	4.69E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E-05	1.00E-01	1.00E-01				
Fluoranthene	2.40E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-04	5.12E-01	5.13E-01				
Fluorene	1.90E+01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-05	4.05E-02	4.06E-02				
Naphthalene	4.60E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-05	9.81E-03	9.88E-03				
Phenanthrene	1.80E+02	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-04	3.84E-01	3.84E-01				
Total LMW PAHs						0.00E+00	1.08E-03	1.09E+00	1.09E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	2.13E-01	2.13E-01				
Benzo[A]Pyrene	1.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-01	2.13E-01				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-04	2.56E-01	2.57E-01				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	1.32E-01	1.33E-01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	1.10E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	2.35E-01	2.35E-01				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.04E-06	4.48E-02	4.48E-02				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-04	1.62E-01	1.62E-01				
Pyrene	1.50E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-04	3.20E-01	3.20E-01				
Total HMW PAHs						0.00E+00	2.88E-03	1.58E+00	1.58E+00	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	0.00E+00	0.00E+00	1.60E-01	1.60E-01	1.80E-03	5.33E-03	1.67E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.00E+01	0.00E+00	0.00E+00	0.00E+00	4.60E-02	4.60E-02	0.00E+00	2.13E-02	6.73E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	0.00E+00	0.00E+00	2.06E-03	2.06E-03	0.00E+00	1.19E-04	2.18E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H2-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	1.11E-08	1.11E-08	0.00E+00	5.76E-10	1.17E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	1.34E-08	1.34E-08	0.00E+00	6.82E-10	1.41E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	1.26E-07	1.26E-09	0.00E+00	5.25E-11	1.31E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	5.41E-08	5.41E-09	0.00E+00	2.43E-10	5.65E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	5.49E-06	5.49E-09	0.00E+00	1.63E-10	5.66E-09				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	8.19E-05	8.19E-09	0.00E+00	1.90E-10	8.38E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	1.83E-08	1.83E-08	0.00E+00	3.80E-09	2.21E-08				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	9.75E-09	9.75E-09	0.00E+00	2.03E-09	1.18E-08				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	1.71E-08	1.71E-09	0.00E+00	3.56E-10	2.07E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	8.00E-09	8.00E-10	0.00E+00	1.66E-10	9.67E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	5.85E-09	5.85E-10	0.00E+00	1.22E-10	7.06E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	5.51E-08	5.51E-10	0.00E+00	1.15E-10	6.65E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	1.72E-07	1.72E-11	0.00E+00	3.58E-12	2.08E-11				
Total Dioxins/Furans						7.65E-08	0.00E+00	8.49E-09	8.50E-08	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-03	0.00E+00	1.22E-03	No TRV	--	No TRV	--
Arsenic	1.18E+01	4.40E-03	0.00E+00	2.18E-01	0.00E+00	2.18E-01	6.97E-04	0.00E+00	2.19E-01	2.24E+00	<1	4.51E+00	<1
Barium	4.20E+02	2.71E+00	0.00E+00	6.05E+00	0.00E+00	6.05E+00	4.29E-01	0.00E+00	6.48E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	1.50E+00	1.50E-03	0.00E+00	1.07E-02	0.00E+00	1.07E-02	2.37E-04	0.00E+00	1.09E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-04	0.00E+00	4.75E-04	1.47E+00	<1	6.35E+00	<1
Chromium	8.48E+01	2.72E-02	0.00E+00	4.11E+00	0.00E+00	4.11E+00	4.31E-03	0.00E+00	4.11E+00	2.66E+00	1.55E+00	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-03	0.00E+00	2.45E-03	7.61E+00	<1	2.02E+01	<1
Copper	7.26E+03	1.83E-01	0.00E+00	5.92E+02	0.00E+00	5.92E+02	2.90E-02	0.00E+00	5.92E+02	4.05E+00	1.46E+02	3.48E+01	1.70E+01
Lead	4.80E+01	3.52E-02	0.00E+00	2.90E+00	0.00E+00	2.90E+00	5.57E-03	0.00E+00	2.90E+00	1.63E+00	1.78E+00	4.46E+01	<1
Manganese	1.14E+03	3.75E+00	0.00E+00	8.57E+00	0.00E+00	8.57E+00	5.94E-01	0.00E+00	9.16E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	4.12E-05	--	4.12E-05	4.50E-01	<1	9.10E-01	<1
Nickel	8.90E+01	5.59E-02	0.00E+00	1.10E+01	0.00E+00	1.10E+01	8.85E-03	0.00E+00	1.10E+01	6.71E+00	1.63E+00	1.86E+01	<1
Selenium	1.20E+00	2.00E-03	0.00E+00	1.68E-01	0.00E+00	1.68E-01	3.17E-04	0.00E+00	1.68E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.40E-01	3.30E-04	0.00E+00	1.20E-03	0.00E+00	1.20E-03	5.22E-05	0.00E+00	1.25E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.77E+01	2.48E-02	0.00E+00	1.84E-01	0.00E+00	1.84E-01	3.93E-03	0.00E+00	1.88E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.14E+02	5.37E-01	0.00E+00	6.40E+01	0.00E+00	6.40E+01	8.50E-02	0.00E+00	6.41E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	7.96E+02	2.24E+01	0.00E+00	1.56E+01	0.00E+00	1.56E+01	3.55E+00	0.00E+00	1.92E+01	1.22E+01	1.57E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	0.00E+00	5.56E+00	0.00E+00	5.56E+00	0.00E+00	0.00E+00	5.56E+00	1.80E-01	3.09E+01	1.80E+00	3.09E+00
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.20E+01	0.00E+00	0.00E+00	5.12E+00	0.00E+00	5.12E+00	0.00E+00	0.00E+00	5.12E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	0.00E+00	1.80E+01	0.00E+00	1.80E+01	9.82E-05	0.00E+00	1.80E+01				
Fluoranthene	2.40E+02	9.30E-03	0.00E+00	1.16E+02	0.00E+00	1.16E+02	1.47E-03	0.00E+00	1.16E+02				
Fluorene	1.90E+01	8.70E-04	0.00E+00	2.88E+01	0.00E+00	2.88E+01	1.38E-04	0.00E+00	2.88E+01				
Naphthalene	4.60E+00	8.70E-04	0.00E+00	3.20E+00	0.00E+00	3.20E+00	1.38E-04	0.00E+00	3.20E+00				
Phenanthrene	1.80E+02	1.50E-03	0.00E+00	4.90E+01	0.00E+00	4.90E+01	2.37E-04	0.00E+00	4.90E+01				
Total LMW PAHs						2.20E+02	2.08E-03	0.00E+00	2.20E+02	1.61E+01	1.36E+01	1.61E+02	1.36E+00
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+02	3.00E-03	0.00E+00	2.52E+01	0.00E+00	2.52E+01	4.75E-04	0.00E+00	2.52E+01				
Benzo[A]Pyrene	1.00E+02	0.00E+00	0.00E+00	2.11E+01	0.00E+00	2.11E+01	0.00E+00	0.00E+00	2.11E+01				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	0.00E+00	4.94E+01	0.00E+00	4.94E+01	1.58E-03	0.00E+00	4.94E+01				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	0.00E+00	2.89E+01	0.00E+00	2.89E+01	6.17E-04	0.00E+00	2.89E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	1.10E+02	7.60E-03	0.00E+00	3.99E+01	0.00E+00	3.99E+01	1.20E-03	0.00E+00	3.99E+01				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	0.00E+00	7.68E+00	0.00E+00	7.68E+00	1.55E-05	0.00E+00	7.68E+00				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	0.00E+00	3.44E+01	0.00E+00	3.44E+01	4.91E-04	0.00E+00	3.44E+01				
Pyrene	1.50E+02	7.00E-03	0.00E+00	4.16E+01	0.00E+00	4.16E+01	1.11E-03	0.00E+00	4.16E+01				
Total HMW PAHs						2.48E+02	5.57E-03	0.00E+00	2.48E+02	2.00E+00	1.24E+02	2.00E+01	1.24E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	0.00E+00	2.15E+01	0.00E+00	2.15E+01	3.48E-03	0.00E+00	2.15E+01	1.10E+00	1.96E+01	1.10E+01	1.96E+00
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.00E+01	0.00E+00	0.00E+00	1.10E+01	0.00E+00	1.10E+01	0.00E+00	0.00E+00	1.10E+01	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	0.00E+00	9.14E-02	0.00E+00	9.14E-02	0.00E+00	0.00E+00	9.14E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H2-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	9.33E-08	0.00E+00	9.33E-08	0.00E+00	0.00E+00	9.33E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	1.14E-07	0.00E+00	1.14E-07	0.00E+00	0.00E+00	1.14E-07				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	1.27E-06	0.00E+00	1.27E-08	0.00E+00	0.00E+00	1.27E-08				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	5.12E-07	0.00E+00	5.12E-08	0.00E+00	0.00E+00	5.12E-08				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	7.36E-05	0.00E+00	7.36E-08	0.00E+00	0.00E+00	7.36E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	1.34E-03	0.00E+00	1.34E-07	0.00E+00	0.00E+00	1.34E-07				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	8.67E-07	0.00E+00	8.67E-07	0.00E+00	0.00E+00	8.67E-07				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	4.13E-07	0.00E+00	4.13E-07	0.00E+00	0.00E+00	4.13E-07				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	8.04E-07	0.00E+00	8.04E-08	0.00E+00	0.00E+00	8.04E-08				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	3.27E-07	0.00E+00	3.27E-08	0.00E+00	0.00E+00	3.27E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	2.26E-07	0.00E+00	2.26E-08	0.00E+00	0.00E+00	2.26E-08				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	3.20E-06	0.00E+00	3.20E-08	0.00E+00	0.00E+00	3.20E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	1.23E-05	0.00E+00	1.23E-09	0.00E+00	0.00E+00	1.23E-09				
Total Dioxins/Furans						1.93E-06	0.00E+00	0.00E+00	1.93E-06	1.75E-06	1.10E+00	1.75E-05	<1

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-6
Screening-Level Exposure Evaluation - Canada Lynx
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-04	0.00E+00	2.41E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.18E+01	4.40E-03	0.00E+00	0.00E+00	1.85E-03	1.85E-03	1.37E-04	1.03E-02	1.23E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.20E+02	2.71E+00	0.00E+00	0.00E+00	8.96E-03	8.96E-03	8.47E-02	3.67E-01	4.61E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	1.50E+00	1.50E-03	0.00E+00	0.00E+00	1.05E-04	1.05E-04	4.69E-05	1.31E-03	1.46E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	0.00E+00	9.37E-05	7.70E-01	<1	6.87E+00	<1
Chromium	8.48E+01	2.72E-02	0.00E+00	0.00E+00	1.89E-01	1.89E-01	8.50E-04	7.42E-02	2.64E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-04	0.00E+00	4.84E-04	7.33E+00	<1	1.89E+01	<1
Copper	7.26E+03	1.83E-01	0.00E+00	0.00E+00	8.69E-01	8.69E-01	5.72E-03	6.35E+00	7.23E+00	5.60E+00	1.29E+00	8.27E+01	<1
Lead	4.80E+01	3.52E-02	0.00E+00	0.00E+00	1.87E-01	1.87E-01	1.10E-03	4.20E-02	2.30E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.14E+03	3.75E+00	0.00E+00	0.00E+00	7.30E-01	7.30E-01	1.17E-01	9.97E-01	1.84E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	8.12E-06	--	8.12E-06	1.41E+00	<1	1.41E+01	<1
Nickel	8.90E+01	5.59E-02	0.00E+00	0.00E+00	1.98E-01	1.98E-01	1.75E-03	7.79E-02	2.77E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.20E+00	2.00E-03	0.00E+00	0.00E+00	2.21E-02	2.21E-02	6.25E-05	1.05E-03	2.32E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.40E-01	3.30E-04	0.00E+00	0.00E+00	4.73E-04	4.73E-04	1.03E-05	1.22E-04	6.06E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	2.77E+01	2.48E-02	0.00E+00	0.00E+00	1.06E-02	1.06E-02	7.75E-04	2.42E-02	3.57E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.14E+02	5.37E-01	0.00E+00	0.00E+00	3.43E+00	3.43E+00	1.68E-02	9.97E-02	3.54E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	8.66E-03	2.05E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	7.96E+02	2.24E+01	0.00E+00	0.00E+00	3.98E-01	3.98E-01	7.00E-01	6.96E-01	1.79E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.20E+00	0.00E+00	0.00E+00	0.00E+00	9.48E-03	9.48E-03	0.00E+00	1.05E-03	1.05E-02	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-02	1.92E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-05	4.11E-02	4.11E-02				
Fluoranthene	2.40E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-04	2.10E-01	2.10E-01				
Fluorene	1.90E+01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-05	1.66E-02	1.66E-02				
Naphthalene	4.60E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-05	4.02E-03	4.05E-03				
Phenanthrene	1.80E+02	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-05	1.57E-01	1.58E-01				
Total LMW PAHs						0.00E+00	4.11E-04	4.48E-01	4.49E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	8.75E-02	8.76E-02				
Benzo[A]Pyrene	1.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.75E-02	8.75E-02				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-04	1.05E-01	1.05E-01				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	5.42E-02	5.44E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	1.10E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	9.62E-02	9.65E-02				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-06	1.84E-02	1.84E-02				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	6.65E-02	6.66E-02				
Pyrene	1.50E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-04	1.31E-01	1.31E-01				
Total HMW PAHs						0.00E+00	1.10E-03	6.47E-01	6.48E-01	6.15E-01	1.05E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	0.00E+00	0.00E+00	6.08E-02	6.08E-02	6.87E-04	2.19E-03	6.37E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.00E+01	0.00E+00	0.00E+00	0.00E+00	1.75E-02	1.75E-02	0.00E+00	8.75E-03	2.63E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	0.00E+00	0.00E+00	7.86E-04	7.86E-04	0.00E+00	4.90E-05	8.35E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H2-6
Screening-Level Exposure Evaluation - Canada Lynx
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	4.23E-09	4.23E-09	0.00E+00	2.36E-10	4.46E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	5.10E-09	5.10E-09	0.00E+00	2.80E-10	5.38E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	4.80E-08	4.80E-09	0.00E+00	2.15E-10	5.01E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	2.06E-08	2.06E-09	0.00E+00	9.97E-11	2.16E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	2.09E-06	2.09E-08	0.00E+00	6.68E-10	2.16E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	3.12E-05	9.36E-09	0.00E+00	2.34E-10	9.59E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	6.96E-09	6.96E-10	0.00E+00	1.56E-10	8.51E-10				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	3.71E-09	1.11E-09	0.00E+00	2.49E-10	1.36E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	6.53E-09	6.53E-10	0.00E+00	1.46E-10	7.99E-10				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	3.05E-09	3.05E-10	0.00E+00	6.82E-11	3.73E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	2.23E-09	2.23E-10	0.00E+00	4.99E-11	2.73E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	2.10E-08	2.10E-10	0.00E+00	4.70E-11	2.57E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	6.57E-08	1.97E-11	0.00E+00	4.41E-12	2.41E-11				
Total Dioxins/Furans						4.97E-08	0.00E+00	2.45E-09	5.21E-08	5.62E-07	<1	3.76E-06	<1

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
- IR_{diet}

= Ingestion rate of food (kg food ingested per day, dry weight)
- B(S)AF

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- DF_i

= Dietary fraction of food item i (proportion of food type in the diet)
- AUF

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
- BW

= Body weight of the receptor, wet weight (kg)
- ADD_{substrate}

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
- IR_s

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-7
Screening-Level Exposure Evaluation - Grizzly Bear
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-04	0.00E+00	1.66E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.18E+01	4.40E-03	6.21E-03	4.47E-03	1.28E-04	0.00E+00	1.08E-02	9.50E-05	7.14E-03	1.09E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.20E+02	2.71E+00	9.20E-01	1.24E-01	6.19E-04	0.00E+00	1.04E+00	5.85E-02	2.54E-01	1.10E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	1.50E+00	1.50E-03	1.11E-02	2.19E-04	7.29E-06	0.00E+00	1.13E-02	3.24E-05	9.07E-04	1.13E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.48E-05	0.00E+00	6.48E-05	7.70E-01	<1	6.87E+00	<1
Chromium	8.48E+01	2.72E-02	4.88E-02	8.41E-02	1.30E-02	0.00E+00	1.46E-01	5.87E-04	5.13E-02	1.46E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04	0.00E+00	3.35E-04	7.33E+00	<1	1.89E+01	<1
Copper	7.26E+03	1.83E-01	9.09E-01	1.21E+01	6.01E-02	0.00E+00	1.31E+01	3.95E-03	4.39E+00	1.31E+01	5.60E+00	2.34E+00	8.27E+01	<1
Lead	4.80E+01	3.52E-02	3.26E-02	5.92E-02	1.29E-02	0.00E+00	1.05E-01	7.60E-04	2.90E-02	1.06E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.14E+03	3.75E+00	1.26E+00	1.75E-01	5.05E-02	0.00E+00	1.49E+00	8.10E-02	6.89E-01	1.57E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	0.00E+00	5.61E-06	--	5.61E-06	1.41E+00	<1	1.41E+01	<1
Nickel	8.90E+01	5.59E-02	4.37E-02	2.24E-01	1.37E-02	0.00E+00	2.82E-01	1.21E-03	5.38E-02	2.83E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.20E+00	2.00E-03	8.72E-03	3.43E-03	1.53E-03	0.00E+00	1.37E-02	4.32E-05	7.26E-04	1.37E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.40E-01	3.30E-04	7.86E-06	2.45E-05	3.27E-05	0.00E+00	6.51E-05	7.13E-06	8.47E-05	7.22E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.77E+01	2.48E-02	1.89E-03	3.77E-03	7.36E-04	0.00E+00	6.39E-03	5.36E-04	1.67E-02	6.93E-03	4.16E+00	<1	9.44E+00	<1
Zinc	1.14E+02	5.37E-01	9.35E-01	1.31E+00	2.37E-01	0.00E+00	2.48E+00	1.16E-02	6.89E-02	2.49E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	5.99E-03	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	7.96E+02	2.24E+01	6.70E-01	3.20E-01	2.75E-02	0.00E+00	1.02E+00	4.84E-01	4.81E-01	1.50E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.20E+00	0.00E+00	1.50E-03	1.14E-01	6.55E-04	0.00E+00	1.16E-01	0.00E+00	7.26E-04	1.16E-01	6.80E-02	1.70E+00	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	2.20E+01	0.00E+00	3.83E-06	1.05E-01	0.00E+00	0.00E+00	1.05E-01	0.00E+00	1.33E-02	1.05E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	1.05E-01	3.68E-01	0.00E+00	0.00E+00	4.73E-01	1.34E-05	2.84E-02	1.34E-01	4.73E-01			
Fluoranthene	2.40E+02	9.30E-03	1.68E+00	2.36E+00	0.00E+00	0.00E+00	4.05E+00	2.01E-04	1.45E-01	4.05E+00				
Fluorene	1.90E+01	8.70E-04	4.34E-06	5.89E-01	0.00E+00	0.00E+00	5.89E-01	1.88E-05	1.15E-02	5.89E-01				
Naphthalene	4.60E+00	8.70E-04	7.88E-01	6.56E-02	0.00E+00	0.00E+00	8.53E-01	1.88E-05	2.78E-03	8.53E-01				
Phenanthrene	1.80E+02	1.50E-03	2.98E-01	1.00E+00	0.00E+00	0.00E+00	1.30E+00	3.24E-05	1.09E-01	1.30E+00				
Total LMW PAHs							7.37E+00	2.84E-04	3.10E-01	7.68E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.00E+02	3.00E-03	1.45E-02	5.15E-01	0.00E+00	0.00E+00	5.30E-01	6.48E-05	6.05E-02	5.30E-01				
Benzo(a)Pyrene	1.00E+02	0.00E+00	1.59E-01	4.31E-01	0.00E+00	0.00E+00	5.90E-01	0.00E+00	6.05E-02	5.90E-01				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	5.22E-01	1.01E+00	0.00E+00	0.00E+00	1.53E+00	2.16E-04	7.26E-02	1.53E+00				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	7.30E-01	5.90E-01	0.00E+00	0.00E+00	1.32E+00	8.42E-05	3.75E-02	1.32E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	1.10E+02	7.60E-03	1.53E-02	8.16E-01	0.00E+00	0.00E+00	8.31E-01	1.64E-04	6.65E-02	8.31E-01				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	3.83E-02	1.57E-01	0.00E+00	0.00E+00	1.95E-01	2.12E-06	1.27E-02	1.95E-01				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	1.17E-01	7.04E-01	0.00E+00	0.00E+00	8.21E-01	6.69E-05	4.60E-02	8.22E-01				
Pyrene	1.50E+02	7.00E-03	1.52E+00	8.50E-01	0.00E+00	0.00E+00	2.37E+00	1.51E-04	9.07E-02	2.37E+00				
Total HMW PAHs							8.19E+00	7.59E-04	4.47E-01	8.63E+00	6.15E-01	1.40E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	8.35E-04	4.41E-01	4.21E-03	0.00E+00	4.46E-01	4.75E-04	1.51E-03	4.46E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.00E+01	0.00E+00	2.64E-01	2.25E-01	1.21E-03	0.00E+00	4.90E-01	0.00E+00	6.05E-03	4.90E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	6.40E-04	1.87E-03	5.43E-05	0.00E+00	2.57E-03	0.00E+00	3.39E-05	2.57E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H2-7
Screening-Level Exposure Evaluation - Grizzly Bear
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	2.70E-07	0.00E+00	3.57E-10	1.91E-09	2.92E-10	0.00E+00	2.56E-09	0.00E+00	1.63E-10	2.56E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	2.32E-10	2.33E-09	3.52E-10	0.00E+00	2.92E-09	0.00E+00	1.93E-10	2.92E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	9.74E-10	2.60E-08	3.32E-09	0.00E+00	3.03E-09	0.00E+00	1.49E-10	3.03E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	4.51E-10	1.05E-08	1.42E-09	0.00E+00	1.23E-09	0.00E+00	6.89E-11	1.23E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.66E-08	1.51E-06	1.45E-07	0.00E+00	1.67E-08	0.00E+00	4.61E-10	1.67E-08				
OCDD	8.91E-04	0.00E+00	1.06E-07	2.75E-05	2.16E-06	0.00E+00	8.93E-09	0.00E+00	1.62E-10	8.93E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	4.23E-09	1.77E-08	4.81E-10	0.00E+00	2.25E-09	0.00E+00	1.08E-10	2.25E-09				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.23E-09	8.44E-09	2.57E-10	0.00E+00	2.98E-09	0.00E+00	1.72E-10	2.98E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	8.67E-10	1.64E-08	4.51E-10	0.00E+00	1.78E-09	0.00E+00	1.01E-10	1.78E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	4.05E-10	6.69E-09	2.11E-10	0.00E+00	7.30E-10	0.00E+00	4.72E-11	7.30E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	4.06E-10	4.62E-09	1.54E-10	0.00E+00	5.18E-10	0.00E+00	3.45E-11	5.18E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	2.09E-09	6.54E-08	1.45E-09	0.00E+00	6.89E-10	0.00E+00	3.25E-11	6.89E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	3.59E-09	2.52E-07	4.54E-09	0.00E+00	7.80E-11	0.00E+00	3.05E-12	7.80E-11				
Total Dioxins/Furans						0.00E+00	4.44E-08	0.00E+00	1.70E-09	4.61E-08	5.62E-07	<1	3.76E-06	<1

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.96E-04	0.00E+00	3.96E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.45E+01	4.40E-03	0.00E+00	0.00E+00	3.61E-03	3.61E-03	2.26E-04	1.20E-02	1.58E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.31E+02	2.71E+00	0.00E+00	0.00E+00	1.51E-02	1.51E-02	1.39E-01	3.55E-01	5.09E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	3.62E+00	1.50E-03	0.00E+00	0.00E+00	4.19E-04	4.19E-04	7.72E-05	2.98E-03	3.48E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	0.00E+00	1.54E-04	7.70E-01	<1	6.87E+00	<1
Chromium	2.87E+01	2.72E-02	0.00E+00	0.00E+00	1.40E-01	1.40E-01	1.40E-03	2.36E-02	1.65E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-04	0.00E+00	7.98E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.84E+03	1.83E-01	0.00E+00	0.00E+00	1.17E+00	1.17E+00	9.42E-03	1.52E+00	2.70E+00	5.60E+00	<1	8.27E+01	<1
Lead	4.96E+01	3.52E-02	0.00E+00	0.00E+00	3.12E-01	3.12E-01	1.81E-03	4.09E-02	3.55E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.03E+03	3.75E+00	0.00E+00	0.00E+00	1.08E+00	1.08E+00	1.93E-01	8.45E-01	2.12E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	1.41E+00	<1	1.41E+01	<1
Nickel	4.04E+02	5.59E-02	0.00E+00	0.00E+00	6.58E-01	6.58E-01	2.88E-03	3.32E-01	9.94E-01	1.70E+00	<1	1.48E+01	<1
Selenium	2.29E+00	2.00E-03	0.00E+00	0.00E+00	4.64E-02	4.64E-02	1.03E-04	1.88E-03	4.83E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	8.41E-01	3.30E-04	0.00E+00	0.00E+00	4.68E-03	4.68E-03	1.70E-05	6.93E-04	5.39E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.15E+02	2.48E-02	0.00E+00	0.00E+00	7.29E-02	7.29E-02	1.28E-03	9.49E-02	1.69E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.12E+02	5.37E-01	0.00E+00	0.00E+00	5.64E+00	5.64E+00	2.76E-02	9.20E-02	5.76E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.22E+01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	1.01E-02	2.95E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.03E+02	2.24E+01	0.00E+00	0.00E+00	4.96E-01	4.96E-01	1.15E+00	4.96E-01	2.14E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	9.83E-01	0.00E+00	0.00E+00	0.00E+00	1.28E-02	1.28E-02	0.00E+00	8.09E-04	1.36E-02	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.65E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-02	2.18E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.78E+01	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-02	3.93E-02				
Fluoranthene	2.40E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-04	1.98E-01	1.98E-01				
Fluorene	2.35E+01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-05	1.93E-02	1.94E-02				
Naphthalene	8.65E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-05	7.12E-03	7.17E-03				
Phenanthrene	2.25E+02	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-05	1.85E-01	1.85E-01				
Total LMW PAHs						0.00E+00	6.77E-04	4.70E-01	4.71E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.18E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	7.55E-02	7.57E-02				
Benzo[A]Pyrene	8.13E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.69E-02	6.69E-02				
Benzo(b)fluoranthene	1.05E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	8.65E-02	8.70E-02				
Benzo(g,h,i)perylene	5.08E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	4.18E-02	4.20E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	1.10E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	9.06E-02	9.10E-02				
Dibenz(A,H)Anthracene	1.95E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-06	1.61E-02	1.61E-02				
Indeno (1,2,3-CD) Pyrene	6.18E+01	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-04	5.08E-02	5.10E-02				
Pyrene	1.35E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	1.11E-01	1.12E-01				
Total HMW PAHs						0.00E+00	1.81E-03	5.39E-01	5.41E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.39E-01	2.20E-02	0.00E+00	0.00E+00	2.56E-02	2.56E-02	1.13E-03	5.26E-04	2.73E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.38E+01	0.00E+00	0.00E+00	0.00E+00	3.96E-02	3.96E-02	0.00E+00	1.13E-02	5.10E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.15E-02	0.00E+00	0.00E+00	0.00E+00	9.59E-04	9.59E-04	0.00E+00	3.42E-05	9.93E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H2-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	6.97E-09	6.97E-09	0.00E+00	2.22E-10	7.19E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	8.40E-09	8.40E-09	0.00E+00	2.63E-10	8.66E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	7.90E-08	7.90E-09	0.00E+00	2.03E-10	8.11E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	3.39E-08	3.39E-09	0.00E+00	9.39E-11	3.49E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	3.45E-06	3.45E-08	0.00E+00	6.28E-10	3.51E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	5.14E-05	1.54E-08	0.00E+00	2.20E-10	1.56E-08				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	1.15E-08	1.15E-09	0.00E+00	1.47E-10	1.29E-09				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	6.12E-09	1.83E-09	0.00E+00	2.35E-10	2.07E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	1.08E-08	1.08E-09	0.00E+00	1.38E-10	1.21E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	5.02E-09	5.02E-10	0.00E+00	6.42E-11	5.66E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	3.67E-09	3.67E-10	0.00E+00	4.69E-11	4.14E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	3.46E-08	3.46E-10	0.00E+00	4.42E-11	3.90E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	1.08E-07	3.24E-11	0.00E+00	4.15E-12	3.66E-11				
Total Dioxins/Furans						8.18E-08	0.00E+00	2.31E-09	8.42E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-9
Screening-Level Exposure Evaluation - Grizzly Bear
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-04	0.00E+00	1.66E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.18E+01	4.40E-03	6.21E-03	4.47E-03	1.28E-04	0.00E+00	1.08E-02	9.50E-05	7.14E-03	1.09E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.20E+02	2.71E+00	9.20E-01	1.24E-01	6.19E-04	0.00E+00	1.04E+00	5.85E-02	2.54E-01	1.10E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	1.50E+00	1.50E-03	1.11E-02	2.19E-04	7.29E-06	0.00E+00	1.13E-02	3.24E-05	9.07E-04	1.13E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.48E-05	0.00E+00	6.48E-05	7.70E-01	<1	6.87E+00	<1
Chromium	8.48E+01	2.72E-02	4.88E-02	8.41E-02	1.30E-02	0.00E+00	1.46E-01	5.87E-04	5.13E-02	1.46E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04	0.00E+00	3.35E-04	7.33E+00	<1	1.89E+01	<1
Copper	7.26E+03	1.83E-01	9.09E-01	1.21E+01	6.01E-02	0.00E+00	1.31E+01	3.95E-03	4.39E+00	1.31E+01	5.60E+00	2.34E+00	8.27E+01	<1
Lead	4.80E+01	3.52E-02	3.26E-02	5.92E-02	1.29E-02	0.00E+00	1.05E-01	7.60E-04	2.90E-02	1.06E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.14E+03	3.75E+00	1.26E+00	1.75E-01	5.05E-02	0.00E+00	1.49E+00	8.10E-02	6.89E-01	1.57E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	0.00E+00	5.61E-06	--	5.61E-06	1.41E+00	<1	1.41E+01	<1
Nickel	8.90E+01	5.59E-02	4.37E-02	2.24E-01	1.37E-02	0.00E+00	2.82E-01	1.21E-03	5.38E-02	2.83E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.20E+00	2.00E-03	8.72E-03	3.43E-03	1.53E-03	0.00E+00	1.37E-02	4.32E-05	7.26E-04	1.37E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.40E-01	3.30E-04	7.86E-06	2.45E-05	3.27E-05	0.00E+00	6.51E-05	7.13E-06	8.47E-05	7.22E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.77E+01	2.48E-02	1.89E-03	3.77E-03	7.36E-04	0.00E+00	6.39E-03	5.36E-04	1.67E-02	6.93E-03	4.16E+00	<1	9.44E+00	<1
Zinc	1.14E+02	5.37E-01	9.35E-01	1.31E+00	2.37E-01	0.00E+00	2.48E+00	1.16E-02	6.89E-02	2.49E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	9.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	5.99E-03	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	7.96E+02	2.24E+01	6.70E-01	3.20E-01	2.75E-02	0.00E+00	1.02E+00	4.84E-01	4.81E-01	1.50E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.20E+00	0.00E+00	1.50E-03	1.14E-01	6.55E-04	0.00E+00	1.16E-01	0.00E+00	7.26E-04	1.16E-01	6.80E-02	1.70E+00	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	2.20E+01	0.00E+00	3.83E-06	1.05E-01	0.00E+00	0.00E+00	1.05E-01	0.00E+00	1.33E-02	1.05E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.70E+01	6.20E-04	1.05E-01	3.68E-01	0.00E+00	0.00E+00	4.73E-01	1.34E-05	2.84E-02	1.34E-01	4.73E-01			
Fluoranthene	2.40E+02	9.30E-03	1.68E+00	2.36E+00	0.00E+00	0.00E+00	4.05E+00	2.01E-04	1.45E-01	4.05E+00				
Fluorene	1.90E+01	8.70E-04	4.34E-06	5.89E-01	0.00E+00	0.00E+00	5.89E-01	1.88E-05	1.15E-02	5.89E-01				
Naphthalene	4.60E+00	8.70E-04	7.88E-01	6.56E-02	0.00E+00	0.00E+00	8.53E-01	1.88E-05	2.78E-03	8.53E-01				
Phenanthrene	1.80E+02	1.50E-03	2.98E-01	1.00E+00	0.00E+00	0.00E+00	1.30E+00	3.24E-05	1.09E-01	1.30E+00				
Total LMW PAHs							7.37E+00	2.84E-04	3.10E-01	7.68E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.00E+02	3.00E-03	1.45E-02	5.15E-01	0.00E+00	0.00E+00	5.30E-01	6.48E-05	6.05E-02	5.30E-01				
Benzo(a)Pyrene	1.00E+02	0.00E+00	1.59E-01	4.31E-01	0.00E+00	0.00E+00	5.90E-01	0.00E+00	6.05E-02	5.90E-01				
Benzo(b)fluoranthene	1.20E+02	1.00E-02	5.22E-01	1.01E+00	0.00E+00	0.00E+00	1.53E+00	2.16E-04	7.26E-02	1.53E+00				
Benzo(g,h,i)perylene	6.20E+01	3.90E-03	7.30E-01	5.90E-01	0.00E+00	0.00E+00	1.32E+00	8.42E-05	3.75E-02	1.32E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	1.10E+02	7.60E-03	1.53E-02	8.16E-01	0.00E+00	0.00E+00	8.31E-01	1.64E-04	6.65E-02	8.31E-01				
Dibenz(A,H)Anthracene	2.10E+01	9.80E-05	3.83E-02	1.57E-01	0.00E+00	0.00E+00	1.95E-01	2.12E-06	1.27E-02	1.95E-01				
Indeno (1,2,3-CD) Pyrene	7.60E+01	3.10E-03	1.17E-01	7.04E-01	0.00E+00	0.00E+00	8.21E-01	6.69E-05	4.60E-02	8.22E-01				
Pyrene	1.50E+02	7.00E-03	1.52E+00	8.50E-01	0.00E+00	0.00E+00	2.37E+00	1.51E-04	9.07E-02	2.37E+00				
Total HMW PAHs							8.19E+00	7.59E-04	4.47E-01	8.63E+00	6.15E-01	1.40E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.50E+00	2.20E-02	8.35E-04	4.41E-01	4.21E-03	0.00E+00	4.46E-01	4.75E-04	1.51E-03	4.46E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.00E+01	0.00E+00	2.64E-01	2.25E-01	1.21E-03	0.00E+00	4.90E-01	0.00E+00	6.05E-03	4.90E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.60E-02	0.00E+00	6.40E-04	1.87E-03	5.43E-05	0.00E+00	2.57E-03	0.00E+00	3.39E-05	2.57E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H2-9
Screening-Level Exposure Evaluation - Grizzly Bear
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	2.70E-07	0.00E+00	3.57E-10	1.91E-09	2.92E-10	0.00E+00	2.56E-09	0.00E+00	1.63E-10	2.56E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	2.32E-10	2.33E-09	3.52E-10	0.00E+00	2.92E-09	0.00E+00	1.93E-10	2.92E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	9.74E-10	2.60E-08	3.32E-09	0.00E+00	3.03E-09	0.00E+00	1.49E-10	3.03E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	4.51E-10	1.05E-08	1.42E-09	0.00E+00	1.23E-09	0.00E+00	6.89E-11	1.23E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.66E-08	1.51E-06	1.45E-07	0.00E+00	1.67E-08	0.00E+00	4.61E-10	1.67E-08				
OCDD	8.91E-04	0.00E+00	1.06E-07	2.75E-05	2.16E-06	0.00E+00	8.93E-09	0.00E+00	1.62E-10	8.93E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	4.23E-09	1.77E-08	4.81E-10	0.00E+00	2.25E-09	0.00E+00	1.08E-10	2.25E-09				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.23E-09	8.44E-09	2.57E-10	0.00E+00	2.98E-09	0.00E+00	1.72E-10	2.98E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	8.67E-10	1.64E-08	4.51E-10	0.00E+00	1.78E-09	0.00E+00	1.01E-10	1.78E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	4.05E-10	6.69E-09	2.11E-10	0.00E+00	7.30E-10	0.00E+00	4.72E-11	7.30E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	4.06E-10	4.62E-09	1.54E-10	0.00E+00	5.18E-10	0.00E+00	3.45E-11	5.18E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	2.09E-09	6.54E-08	1.45E-09	0.00E+00	6.89E-10	0.00E+00	3.25E-11	6.89E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	3.59E-09	2.52E-07	4.54E-09	0.00E+00	7.80E-11	0.00E+00	3.05E-12	7.80E-11				
Total Dioxins/Furans						0.00E+00	4.44E-08	0.00E+00	1.70E-09	4.61E-08	5.62E-07	<1	3.76E-06	<1

Notes:

signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:	ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
	IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
	B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
	C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
	DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
	AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
	BW	= Body weight of the receptor, wet weight (kg)
	ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
	IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
	C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-10
Screening-Level Exposure Evaluation - North American Wolverine
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-04	0.00E+00	2.31E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.45E+01	4.40E-03	0.00E+00	0.00E+00	2.11E-03	2.11E-03	1.32E-04	1.22E-02	1.45E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.31E+02	2.71E+00	0.00E+00	0.00E+00	8.83E-03	8.83E-03	8.14E-02	3.62E-01	4.53E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	3.62E+00	1.50E-03	0.00E+00	0.00E+00	2.45E-04	2.45E-04	4.51E-05	3.05E-03	3.34E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	0.00E+00	9.01E-05	7.70E-01	<1	6.87E+00	<1
Chromium	2.87E+01	2.72E-02	0.00E+00	0.00E+00	8.19E-02	8.19E-02	8.17E-04	2.41E-02	1.07E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-04	0.00E+00	4.66E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.84E+03	1.83E-01	0.00E+00	0.00E+00	6.86E-01	6.86E-01	5.50E-03	1.55E+00	2.24E+00	5.60E+00	<1	8.27E+01	<1
Lead	4.96E+01	3.52E-02	0.00E+00	0.00E+00	1.82E-01	1.82E-01	1.06E-03	4.17E-02	2.25E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.03E+03	3.75E+00	0.00E+00	0.00E+00	6.32E-01	6.32E-01	1.13E-01	8.64E-01	1.61E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	7.81E-06	--	7.81E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.04E+02	5.59E-02	0.00E+00	0.00E+00	3.84E-01	3.84E-01	1.68E-03	3.40E-01	7.26E-01	1.70E+00	<1	1.48E+01	<1
Selenium	2.29E+00	2.00E-03	0.00E+00	0.00E+00	2.71E-02	2.71E-02	6.01E-05	1.92E-03	2.91E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	8.41E-01	3.30E-04	0.00E+00	0.00E+00	2.73E-03	2.73E-03	9.92E-06	7.08E-04	3.45E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.15E+02	2.48E-02	0.00E+00	0.00E+00	4.26E-02	4.26E-02	7.45E-04	9.69E-02	1.40E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.12E+02	5.37E-01	0.00E+00	0.00E+00	3.29E+00	3.29E+00	1.61E-02	9.40E-02	3.40E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.22E+01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.03E-02	2.16E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.03E+02	2.24E+01	0.00E+00	0.00E+00	2.90E-01	2.90E-01	6.73E-01	5.07E-01	1.47E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	9.83E-01	0.00E+00	0.00E+00	0.00E+00	7.46E-03	7.46E-03	0.00E+00	8.27E-04	8.29E-03	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.65E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-02	2.23E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.78E+01	6.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-05	4.02E-02	4.02E-02				
Fluoranthene	2.40E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-04	2.02E-01	2.02E-01				
Fluorene	2.35E+01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	1.98E-02	1.98E-02				
Naphthalene	8.65E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	7.28E-03	7.30E-03				
Phenanthrene	2.25E+02	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	1.89E-01	1.89E-01				
Total LMW PAHs						0.00E+00	3.95E-04	4.81E-01	4.81E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.18E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	7.72E-02	7.73E-02				
Benzo[A]Pyrene	8.13E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-02	6.84E-02				
Benzo(b)fluoranthene	1.05E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	8.83E-02	8.86E-02				
Benzo(g,h,i)perylene	5.08E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-04	4.27E-02	4.28E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	1.10E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	9.25E-02	9.28E-02				
Dibenz(A,H)Anthracene	1.95E+01	9.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-06	1.64E-02	1.64E-02				
Indeno (1,2,3-CD) Pyrene	6.18E+01	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-05	5.19E-02	5.20E-02				
Pyrene	1.35E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-04	1.14E-01	1.14E-01				
Total HMW PAHs						0.00E+00	1.06E-03	5.51E-01	5.52E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.39E-01	2.20E-02	0.00E+00	0.00E+00	1.50E-02	1.50E-02	6.61E-04	5.37E-04	1.62E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.38E+01	0.00E+00	0.00E+00	0.00E+00	2.31E-02	2.31E-02	0.00E+00	1.16E-02	3.47E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.15E-02	0.00E+00	0.00E+00	0.00E+00	5.60E-04	5.60E-04	0.00E+00	3.49E-05	5.95E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H2-10
Screening-Level Exposure Evaluation - North American Wolverine
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	4.07E-09	4.07E-09	0.00E+00	2.27E-10	4.29E-09					
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	4.90E-09	4.90E-09	0.00E+00	2.69E-10	5.17E-09					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	4.61E-08	4.61E-09	0.00E+00	2.07E-10	4.82E-09					
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	1.98E-08	1.98E-09	0.00E+00	9.59E-11	2.08E-09					
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	2.01E-06	2.01E-08	0.00E+00	6.42E-10	2.08E-08					
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	3.00E-05	9.00E-09	0.00E+00	2.25E-10	9.22E-09					
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	6.69E-09	6.69E-10	0.00E+00	1.50E-10	8.19E-10					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	3.57E-09	1.07E-09	0.00E+00	2.40E-10	1.31E-09					
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	6.28E-09	6.28E-10	0.00E+00	1.40E-10	7.68E-10					
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	2.93E-09	2.93E-10	0.00E+00	6.56E-11	3.59E-10					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	2.14E-09	2.14E-10	0.00E+00	4.80E-11	2.62E-10					
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	2.02E-08	2.02E-10	0.00E+00	4.52E-11	2.47E-10					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	6.31E-08	1.89E-11	0.00E+00	4.24E-12	2.32E-11					
Total Dioxins/Furans						4.78E-08	0.00E+00	2.36E-09	5.01E-08	5.62E-07	<1	3.76E-06	<1	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H2-11
Screening-Level Exposure Evaluation -Short-tailed Shrew
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-03	0.00E+00	1.03E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.45E+01	4.40E-03	0.00E+00	2.14E-01	0.00E+00	2.14E-01	5.90E-04	2.14E-02	2.36E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.31E+02	2.71E+00	0.00E+00	5.25E+00	0.00E+00	5.25E+00	3.63E-01	6.35E-01	6.25E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	3.62E+00	1.50E-03	0.00E+00	2.18E-02	0.00E+00	2.18E-02	2.01E-04	5.34E-03	2.74E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-04	0.00E+00	4.02E-04	7.70E-01	<1	6.87E+00	<1
Chromium	2.87E+01	2.72E-02	0.00E+00	1.18E+00	0.00E+00	1.18E+00	3.65E-03	4.23E-02	1.22E+00	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-03	0.00E+00	2.08E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.84E+03	1.83E-01	0.00E+00	1.27E+02	0.00E+00	1.27E+02	2.45E-02	2.71E+00	1.30E+02	5.60E+00	2.32E+01	8.27E+01	1.57E+00
Lead	4.96E+01	3.52E-02	0.00E+00	2.52E+00	0.00E+00	2.52E+00	4.72E-03	7.32E-02	2.59E+00	4.70E+00	<1	1.86E+02	<1
Manganese	1.03E+03	3.75E+00	0.00E+00	6.75E+00	0.00E+00	6.75E+00	5.03E-01	1.51E+00	8.77E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.48E-05	--	3.48E-05	1.41E+00	<1	1.41E+01	<1
Nickel	4.04E+02	5.59E-02	0.00E+00	4.21E+01	0.00E+00	4.21E+01	7.49E-03	5.95E-01	4.27E+01	1.70E+00	2.51E+01	1.48E+01	2.88E+00
Selenium	2.29E+00	2.00E-03	0.00E+00	2.28E-01	0.00E+00	2.28E-01	2.68E-04	3.37E-03	2.32E-01	1.43E-01	1.62E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	8.41E-01	3.30E-04	0.00E+00	6.10E-03	0.00E+00	6.10E-03	4.42E-05	1.24E-03	7.38E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.15E+02	2.48E-02	0.00E+00	6.49E-01	0.00E+00	6.49E-01	3.32E-03	1.70E-01	8.22E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.12E+02	5.37E-01	0.00E+00	5.38E+01	0.00E+00	5.38E+01	7.20E-02	1.65E-01	5.41E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.22E+01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	1.80E-02	6.87E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.03E+02	2.24E+01	0.00E+00	1.00E+01	0.00E+00	1.00E+01	3.00E+00	8.88E-01	1.39E+01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	9.83E-01	0.00E+00	0.00E+00	3.85E+00	0.00E+00	3.85E+00	0.00E+00	1.45E-03	3.85E+00	6.80E-02	5.66E+01	6.80E-01	5.66E+00
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.65E+01	0.00E+00	0.00E+00	5.22E+00	0.00E+00	5.22E+00	0.00E+00	3.91E-02	5.26E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.78E+01	6.20E-04	0.00E+00	1.55E+01	0.00E+00	1.55E+01	8.31E-05	7.04E-02	8.31E+01	1.56E+01			
Fluoranthene	2.40E+02	9.30E-03	0.00E+00	9.78E+01	0.00E+00	9.78E+01	1.25E-03	3.54E-01	9.81E+01				
Fluorene	2.35E+01	8.70E-04	0.00E+00	3.01E+01	0.00E+00	3.01E+01	1.17E-04	3.46E-02	3.02E+01				
Naphthalene	8.65E+00	8.70E-04	0.00E+00	5.10E+00	0.00E+00	5.10E+00	1.17E-04	1.28E-02	5.11E+00				
Phenanthrene	2.25E+02	1.50E-03	0.00E+00	5.19E+01	0.00E+00	5.19E+01	2.01E-04	3.32E-01	5.22E+01				
Total LMW PAHs						2.06E+02	1.76E-03	8.42E-01	2.06E+02	6.56E+01	3.15E+00	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.18E+01	3.00E-03	0.00E+00	1.96E+01	0.00E+00	1.96E+01	4.02E-04	1.35E-01	1.97E+01				
Benzo[A]Pyrene	8.13E+01	0.00E+00	0.00E+00	1.45E+01	0.00E+00	1.45E+01	0.00E+00	1.20E-01	1.46E+01				
Benzo(b)fluoranthene	1.05E+02	1.00E-02	0.00E+00	3.66E+01	0.00E+00	3.66E+01	1.34E-03	1.55E-01	3.67E+01				
Benzo(g,h,i)perylene	5.08E+01	3.90E-03	0.00E+00	2.00E+01	0.00E+00	2.00E+01	5.23E-04	7.48E-02	2.01E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	1.10E+02	7.60E-03	0.00E+00	3.38E+01	0.00E+00	3.38E+01	1.02E-03	1.62E-01	3.39E+01				
Dibenz(A,H)Anthracene	1.95E+01	9.80E-05	0.00E+00	6.04E+00	0.00E+00	6.04E+00	1.31E-05	2.87E-02	6.07E+00				
Indeno (1,2,3-CD) Pyrene	6.18E+01	3.10E-03	0.00E+00	2.37E+01	0.00E+00	2.37E+01	4.15E-04	9.10E-02	2.38E+01				
Pyrene	1.35E+02	7.00E-03	0.00E+00	3.17E+01	0.00E+00	3.17E+01	9.38E-04	1.99E-01	3.19E+01				
Total HMW PAHs						1.86E+02	4.71E-03	9.66E-01	1.87E+02	6.15E-01	3.04E+02	3.84E+01	4.86E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.39E-01	2.20E-02	0.00E+00	4.66E+00	0.00E+00	4.66E+00	2.95E-03	9.42E-04	4.66E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.38E+01	0.00E+00	0.00E+00	1.28E+01	0.00E+00	1.28E+01	0.00E+00	2.03E-02	1.28E+01	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.15E-02	0.00E+00	0.00E+00	5.74E-02	0.00E+00	5.74E-02	0.00E+00	6.12E-05	5.74E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.06E+00	8.42E+00	--	2.27E+01	--

Table H2-11
Screening-Level Exposure Evaluation -Short-tailed Shrew
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	7.90E-08	0.00E+00	7.90E-08	0.00E+00	3.98E-10	7.94E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	9.65E-08	0.00E+00	9.65E-08	0.00E+00	4.72E-10	9.70E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	1.08E-06	0.00E+00	1.08E-07	0.00E+00	3.63E-10	1.08E-07				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	4.33E-07	0.00E+00	4.33E-08	0.00E+00	1.68E-10	4.35E-08				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	6.23E-05	0.00E+00	6.23E-07	0.00E+00	1.12E-09	6.24E-07				
OCDD	8.91E-04	0.00E+00	0.00E+00	1.14E-03	0.00E+00	3.41E-07	0.00E+00	3.94E-10	3.42E-07				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	7.34E-07	0.00E+00	7.34E-08	0.00E+00	2.62E-10	7.36E-08				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	3.49E-07	0.00E+00	1.05E-07	0.00E+00	4.20E-10	1.05E-07				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	6.80E-07	0.00E+00	6.80E-08	0.00E+00	2.46E-10	6.83E-08				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	2.77E-07	0.00E+00	2.77E-08	0.00E+00	1.15E-10	2.78E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	1.91E-07	0.00E+00	1.91E-08	0.00E+00	8.40E-11	1.92E-08				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	2.71E-06	0.00E+00	2.71E-08	0.00E+00	7.92E-11	2.71E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	1.04E-05	0.00E+00	3.13E-09	0.00E+00	7.43E-12	3.13E-09				
Total Dioxins/Furans						1.61E-06	0.00E+00	4.13E-09	1.62E-06	5.62E-07	2.88E+00	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
					Plants			Soil Invertebrates			Small Mammals		
					Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals													
Aluminum	NA	2.45E+01	0.00E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	2.80E+00	2.80E+00	Regression ^a	1.04E-01	USEPA (2007)	1.00E+00	2.80E+00	Assumption ^c	5.00E-02	1.40E-01	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	2.35E+01	2.35E+01	3.75E-02	8.82E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.24E+00	Sample et al. (1999)	Regression ^f	1.04E-01	Sample et al. (1998b)
Barium	NA	2.71E+00	2.27E+02	2.27E+02	1.56E-01	3.54E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.07E+01	Sample et al. (1998a)	6.83E-04	1.55E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	7.20E+00	7.20E+00	Regression ^a	2.49E+00	USEPA (2007)	4.50E-02	3.24E-01	Sample et al. (1998a)	2.25E-03	1.62E-02	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	9.40E-01	9.40E-01	Regression ^a	6.01E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.88E+00	Sample et al. (1999)	Regression ^f	2.76E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	3.92E+01	3.92E+01	4.10E-02	1.61E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	1.20E+01	Sample et al. (1998a)	Regression ^f	3.43E+00	Sample et al. (1998b)
Cobalt	NA	1.55E-02	1.60E+01	1.60E+01	7.50E-03	1.20E-01	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.95E+00	Sample et al. (1998a)	Regression ^f	4.30E-01	Sample et al. (1998b)
Copper	NA	1.83E-01	5.46E+01	5.46E+01	Regression ^a	9.43E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.81E+01	Sample et al. (1998a)	Regression ^f	1.37E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	1.94E+01	1.94E+01	Regression ^a	1.40E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.80E+00	Sample et al. (1999)	Regression ^f	4.00E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	0.00E+00	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	4.63E+02	4.63E+02	Regression ^a	1.07E+01	Bechtel-Jacobs (1998a)	7.78E-01	3.60E+02	Sample et al. (1998a)	Regression ^f	1.36E+01	Sample et al. (1998b)
Selenium	NA	2.00E-03	7.50E-01	7.50E-01	Regression ^a	3.70E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.51E-01	Sample et al. (1998a)	Regression ^f	5.92E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.70E-01	1.70E-01	4.00E-03	6.80E-04	Baes et al. (1984)	5.41E-02	9.20E-03	USCHPPM (2004)	1.08E-01	1.84E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	1.69E+02	1.69E+02	4.85E-03	8.20E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.10E+00	Sample et al. (1998a)	1.23E-02	2.08E+00	Sample et al. (1998b) ^j
Zinc	NA	5.37E-01	6.70E+01	6.70E+01	Regression ^a	4.96E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.40E+02	Sample et al. (1998a)	Regression ^f	1.06E+02	Sample et al. (1998b)
Inorganics - Other Inorganics													
Cyanide	NA	3.78E-01	1.90E-01	1.90E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	3.98E+02	3.98E+02	6.00E-02	2.39E+01	Baes et al. (1984)	1.24E-01	4.94E+01	USCHPPM (2004)	1.60E-02	6.37E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	6.34	0.00E+00	ND	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	3.92	0.00E+00	3.40E+00	3.40E+00	Regression ^a	1.35E-03	USEPA (2007a)	1.47E+00	5.00E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	7.10E+01	7.10E+01	5.00E-01	3.55E+01	USEPA (2007a)	3.04E+00	2.16E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	1.80E+00	1.80E+00	1.22E+01	2.20E+01	USEPA (2007a)	4.40E+00	7.92E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	4.00E+01	4.00E+01	Regression ^a	8.35E+00	USEPA (2007a)	1.72E+00	6.88E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs													
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.7	3.00E-03	4.30E+01	4.30E+01	Regression ^a	6.24E-01	USEPA (2007a)	1.59E+00	6.84E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	5.30E+01	5.30E+01	Regression ^a	6.11E+00	USEPA (2007a)	1.33E+00	7.05E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	6.00E+01	6.00E+01	3.10E-01	1.86E+01	USEPA (2007a)	2.60E+00	1.56E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	4.30E+01	4.30E+01	Regression ^a	3.37E+01	USEPA (2007a)	2.94E+00	1.26E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	5.10E+01	5.10E+01	Regression ^a	6.90E-01	USEPA (2007a)	2.29E+00	1.17E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H3-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
					Plants			Soil Invertebrates			Small Mammals		
					Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	6.70E+01	6.70E+01	7.20E-01	4.82E+01	USEPA (2007a)	1.75E+00	1.17E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs													
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	ND	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	ND	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	ND	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	3.59	0.00E+00	ND	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans													
2,3,7,8-TCDD	6.92	0.00E+00	ND	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H3-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H3-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	2.88E+00	Regression ^a	1.06E-01	USEPA (2007)	1.00E+00	2.88E+00	Assumption ^c	5.00E-02	1.44E-01	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	2.33E+01	3.75E-02	8.73E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.23E+00	Sample et al. (1999)	Regression ^f	1.03E-01	Sample et al. (1998b)
Barium	NA	2.71E+00	2.32E+02	1.56E-01	3.62E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.11E+01	Sample et al. (1998a)	6.83E-04	1.59E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	7.58E+00	Regression ^a	2.59E+00	USEPA (2007)	4.50E-02	3.41E-01	Sample et al. (1998a)	2.25E-03	1.70E-02	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	1.17E+00	Regression ^a	6.77E-01	Bechtel-Jacobs (1998a)	Regression ^d	9.37E+00	Sample et al. (1999)	Regression ^f	3.06E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	2.56E+01	4.10E-02	1.05E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	7.82E+00	Sample et al. (1998a)	Regression ^f	2.50E+00	Sample et al. (1998b)
Cobalt	NA	1.55E-02	1.57E+01	7.50E-03	1.18E-01	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.92E+00	Sample et al. (1998a)	Regression ^f	4.20E-01	Sample et al. (1998b)
Copper	NA	1.83E-01	5.96E+02	Regression ^a	2.42E+01	Bechtel-Jacobs (1998a)	5.15E-01	3.07E+02	Sample et al. (1998a)	Regression ^f	1.94E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	1.90E+01	Regression ^a	1.38E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.64E+00	Sample et al. (1999)	Regression ^f	3.96E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	5.01E+02	Regression ^a	1.13E+01	Bechtel-Jacobs (1998a)	7.78E-01	3.89E+02	Sample et al. (1998a)	Regression ^f	1.41E+01	Sample et al. (1998b)
Selenium	NA	2.00E-03	4.80E-01	Regression ^a	2.26E-01	Bechtel-Jacobs (1998a)	Regression ^d	5.42E-01	Sample et al. (1998a)	Regression ^f	5.01E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.85E-01	4.00E-03	7.40E-04	Baes et al. (1984)	5.41E-02	1.00E-02	USCHPPM (2004)	1.08E-01	2.00E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	1.65E+02	4.85E-03	7.98E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.91E+00	Sample et al. (1998a)	1.23E-02	2.02E+00	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	5.82E+01	Regression ^a	4.59E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.24E+02	Sample et al. (1998a)	Regression ^f	1.05E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	1.73E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	6.14E+02	6.00E-02	3.68E+01	Baes et al. (1984)	1.24E-01	7.61E+01	USCHPPM (2004)	1.60E-02	9.82E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	1.45E+00	Regression ^a	2.80E-03	USEPA (2007a)	1.47E+00	2.13E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	2.32E+01	5.00E-01	1.16E+01	USEPA (2007a)	3.04E+00	7.04E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	5.55E-01	1.22E+01	6.77E+00	USEPA (2007a)	4.40E+00	2.44E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	1.27E+01	Regression ^a	4.10E+00	USEPA (2007a)	1.72E+00	2.18E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												

Table H3-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	1.42E+01	Regression ^a	3.23E-01	USEPA (2007a)	1.59E+00	2.26E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	1.79E+01	Regression ^a	2.12E+00	USEPA (2007a)	1.33E+00	2.38E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	1.97E+01	3.10E-01	6.11E+00	USEPA (2007a)	2.60E+00	5.13E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	1.54E+01	Regression ^a	1.00E+01	USEPA (2007a)	2.94E+00	4.53E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	1.69E+01	Regression ^a	3.58E-01	USEPA (2007a)	2.29E+00	3.86E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	2.25E+01	7.20E-01	1.62E+01	USEPA (2007a)	1.75E+00	3.93E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H3-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H3-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfill Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H3-2
Screening-Level Exposure Evaluation - American Woodcock
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	7.70E-03	1.22E-03	2.96E-01	0.00E+00	2.97E-01	9.05E-04	2.47E-02	3.23E-01	No TRV	--	No TRV	--
Arsenic	2.35E+01	4.40E-03	1.04E-02	2.37E-01	0.00E+00	2.48E-01	5.17E-04	2.07E-01	4.55E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.27E+02	2.71E+00	4.16E-01	2.18E+00	0.00E+00	2.60E+00	3.18E-01	2.00E+00	4.92E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	7.20E+00	1.50E-03	2.93E-02	3.43E-02	0.00E+00	6.36E-02	1.76E-04	6.34E-02	1.27E-01	No TRV	--	No TRV	--
Cadmium	9.40E-01	3.00E-03	7.06E-03	8.34E-01	0.00E+00	8.41E-01	3.52E-04	8.28E-03	8.49E-01	1.47E+00	<1	6.35E+00	<1
Chromium	3.92E+01	2.72E-02	1.89E-02	1.27E+00	0.00E+00	1.29E+00	3.20E-03	3.45E-01	1.64E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	1.60E+01	1.55E-02	1.41E-03	2.06E-01	0.00E+00	2.08E-01	1.82E-03	1.41E-01	3.51E-01	7.61E+00	<1	2.02E+01	<1
Copper	5.46E+01	1.83E-01	1.11E-01	2.97E+00	0.00E+00	3.08E+00	2.15E-02	4.81E-01	3.59E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.94E+01	3.52E-02	1.64E-02	9.31E-01	0.00E+00	9.47E-01	4.14E-03	1.71E-01	1.12E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-01	0.00E+00	4.41E-01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.05E-05	--	3.05E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.63E+02	5.59E-02	1.25E-01	3.81E+01	0.00E+00	3.82E+01	6.57E-03	4.08E+00	4.23E+01	6.71E+00	6.30E+00	1.86E+01	2.27E+00
Selenium	7.50E-01	2.00E-03	4.35E-03	7.94E-02	0.00E+00	8.38E-02	2.35E-04	6.61E-03	9.06E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	3.30E-04	7.99E-06	9.72E-04	0.00E+00	9.80E-04	3.88E-05	1.50E-03	2.52E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.69E+02	2.48E-02	9.63E-03	7.50E-01	0.00E+00	7.60E-01	2.91E-03	1.49E+00	2.25E+00	3.44E-01	6.55E+00	1.70E+00	1.32E+00
Zinc	6.70E+01	5.37E-01	5.83E-01	3.59E+01	0.00E+00	3.65E+01	6.31E-02	5.90E-01	3.72E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	1.67E-03	4.61E-02	4.00E-02	1.15E+00	4.00E-01	<1
Fluoride	3.98E+02	2.24E+01	2.81E-01	5.22E+00	0.00E+00	5.50E+00	2.63E+00	3.51E+00	1.16E+01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	3.40E+00	0.00E+00	1.58E-05	5.28E-01	0.00E+00	5.28E-01	0.00E+00	3.00E-02	5.58E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Fluoranthene	7.10E+01	9.30E-03	4.17E-01	2.28E+01	0.00E+00	2.32E+01	1.09E-03	6.26E-01	2.39E+01				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Naphthalene	1.80E+00	8.70E-04	2.58E-01	8.37E-01	0.00E+00	1.10E+00	1.02E-04	1.59E-02	1.11E+00				
Phenanthrene	4.00E+01	1.50E-03	9.80E-02	7.27E+00	0.00E+00	7.37E+00	1.76E-04	3.52E-01	7.73E+00				
Total LMW PAHs						3.22E+01	1.55E-03	1.02E+00	3.33E+01	1.61E+01	2.07E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.30E+01	3.00E-03	7.33E-03	7.23E+00	0.00E+00	7.24E+00	3.52E-04	3.79E-01	7.62E+00				
Benzo(A)Pyrene	5.30E+01	0.00E+00	7.18E-02	7.45E+00	0.00E+00	7.52E+00	0.00E+00	4.67E-01	7.99E+00				
Benzo(b)fluoranthene	6.00E+01	1.00E-02	2.19E-01	1.65E+01	0.00E+00	1.67E+01	1.17E-03	5.29E-01	1.72E+01				
Benzo(g,h,i)perylene	4.30E+01	3.90E-03	3.96E-01	1.34E+01	0.00E+00	1.38E+01	4.58E-04	3.79E-01	1.41E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	5.10E+01	7.60E-03	8.11E-03	1.23E+01	0.00E+00	1.24E+01	8.93E-04	4.49E-01	1.28E+01				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.15E-05	--	1.15E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.64E-04	--	3.64E-04				
Pyrene	6.70E+01	7.00E-03	5.67E-01	1.24E+01	0.00E+00	1.30E+01	8.22E-04	5.90E-01	1.36E+01				
Total HMW PAHs						7.06E+01	4.13E-03	2.79E+00	7.34E+01	2.00E+00	3.67E+01	2.00E+01	3.67E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	2.58E-03	--	2.58E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H3-2
Screening-Level Exposure Evaluation - American Woodcock
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-3
Screening-Level Exposure Evaluation - Mourning Dove
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	7.70E-03	1.18E-02	0.00E+00	0.00E+00	1.18E-02	8.79E-04	2.17E-02	3.44E-02	No TRV	--	No TRV	--
Arsenic	2.35E+01	4.40E-03	1.01E-01	0.00E+00	0.00E+00	1.01E-01	5.02E-04	1.82E-01	2.84E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.27E+02	2.71E+00	4.04E+00	0.00E+00	0.00E+00	4.04E+00	3.09E-01	1.76E+00	6.11E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	7.20E+00	1.50E-03	2.85E-01	0.00E+00	0.00E+00	2.85E-01	1.71E-04	5.59E-02	3.41E-01	No TRV	--	No TRV	--
Cadmium	9.40E-01	3.00E-03	6.86E-02	0.00E+00	0.00E+00	6.86E-02	3.42E-04	7.30E-03	7.63E-02	1.47E+00	<1	6.35E+00	<1
Chromium	3.92E+01	2.72E-02	1.83E-01	0.00E+00	0.00E+00	1.83E-01	3.10E-03	3.04E-01	4.91E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	1.60E+01	1.55E-02	1.37E-02	0.00E+00	0.00E+00	1.37E-02	1.77E-03	1.24E-01	1.40E-01	7.61E+00	<1	2.02E+01	<1
Copper	5.46E+01	1.83E-01	1.08E+00	0.00E+00	0.00E+00	1.08E+00	2.09E-02	4.24E-01	1.52E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.94E+01	3.52E-02	1.60E-01	0.00E+00	0.00E+00	1.60E-01	4.02E-03	1.51E-01	3.14E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.28E-01	0.00E+00	4.28E-01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.63E+02	5.59E-02	1.22E+00	0.00E+00	0.00E+00	1.22E+00	6.38E-03	3.59E+00	4.82E+00	6.71E+00	<1	1.86E+01	<1
Selenium	7.50E-01	2.00E-03	4.22E-02	0.00E+00	0.00E+00	4.22E-02	2.28E-04	5.82E-03	4.83E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	3.30E-04	7.76E-05	0.00E+00	0.00E+00	7.76E-05	3.77E-05	1.32E-03	1.43E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.69E+02	2.48E-02	9.36E-02	0.00E+00	0.00E+00	9.36E-02	2.83E-03	1.31E+00	1.41E+00	3.44E-01	4.09E+00	1.70E+00	<1
Zinc	6.70E+01	5.37E-01	5.66E+00	0.00E+00	0.00E+00	5.66E+00	6.13E-02	5.20E-01	6.24E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	1.47E-03	4.46E-02	4.00E-02	1.12E+00	4.00E-01	<1
Fluoride	3.98E+02	2.24E+01	2.73E+00	0.00E+00	0.00E+00	2.73E+00	2.56E+00	3.09E+00	8.37E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	3.40E+00	0.00E+00	1.54E-04	0.00E+00	0.00E+00	1.54E-04	0.00E+00	2.64E-02	2.65E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.08E-05	--	7.08E-05				
Fluoranthene	7.10E+01	9.30E-03	4.05E+00	0.00E+00	0.00E+00	4.05E+00	1.06E-03	5.51E-01	4.60E+00				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Naphthalene	1.80E+00	8.70E-04	2.51E+00	0.00E+00	0.00E+00	2.51E+00	9.93E-05	1.40E-02	2.52E+00				
Phenanthrene	4.00E+01	1.50E-03	9.53E-01	0.00E+00	0.00E+00	9.53E-01	1.71E-04	3.10E-01	1.26E+00				
Total LMW PAHs						7.51E+00	1.50E-03	9.02E-01	8.41E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.30E+01	3.00E-03	7.12E-02	0.00E+00	0.00E+00	7.12E-02	3.42E-04	3.34E-01	4.05E-01				
Benzo(A)Pyrene	5.30E+01	0.00E+00	6.97E-01	0.00E+00	0.00E+00	6.97E-01	0.00E+00	4.11E-01	1.11E+00				
Benzo(b)fluoranthene	6.00E+01	1.00E-02	2.12E+00	0.00E+00	0.00E+00	2.12E+00	1.14E-03	4.66E-01	2.59E+00				
Benzo(g,h,i)perylene	4.30E+01	3.90E-03	3.85E+00	0.00E+00	0.00E+00	3.85E+00	4.45E-04	3.34E-01	4.18E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	5.10E+01	7.60E-03	7.88E-02	0.00E+00	0.00E+00	7.88E-02	8.67E-04	3.96E-01	4.75E-01				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.12E-05	--	1.12E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.54E-04	--	3.54E-04				
Pyrene	6.70E+01	7.00E-03	5.51E+00	0.00E+00	0.00E+00	5.51E+00	7.99E-04	5.20E-01	6.03E+00				
Total HMW PAHs						1.23E+01	4.01E-03	2.46E+00	1.48E+01	2.00E+00	7.39E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	2.51E-03	--	2.51E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H3-3
Screening-Level Exposure Evaluation - Mourning Dove
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	7.70E-03	0.00E+00	0.00E+00	1.15E-02	1.15E-02	6.31E-04	5.97E-03	1.81E-02	No TRV	--	No TRV	--
Arsenic	2.35E+01	4.40E-03	0.00E+00	0.00E+00	8.54E-03	8.54E-03	3.61E-04	5.01E-02	5.90E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.27E+02	2.71E+00	0.00E+00	0.00E+00	1.27E-02	1.27E-02	2.22E-01	4.84E-01	7.19E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	7.20E+00	1.50E-03	0.00E+00	0.00E+00	1.33E-03	1.33E-03	1.23E-04	1.54E-02	1.68E-02	No TRV	--	No TRV	--
Cadmium	9.40E-01	3.00E-03	0.00E+00	0.00E+00	2.27E-02	2.27E-02	2.46E-04	2.00E-03	2.49E-02	1.47E+00	<1	6.35E+00	<1
Chromium	3.92E+01	2.72E-02	0.00E+00	0.00E+00	2.81E-01	2.81E-01	2.23E-03	8.36E-02	3.67E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	1.60E+01	1.55E-02	0.00E+00	0.00E+00	3.53E-02	3.53E-02	1.27E-03	3.41E-02	7.07E-02	7.61E+00	<1	2.02E+01	<1
Copper	5.46E+01	1.83E-01	0.00E+00	0.00E+00	1.13E+00	1.13E+00	1.50E-02	1.16E-01	1.26E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.94E+01	3.52E-02	0.00E+00	0.00E+00	3.28E-01	3.28E-01	2.89E-03	4.14E-02	3.73E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-01	0.00E+00	3.08E-01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.13E-05	--	2.13E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.63E+02	5.59E-02	0.00E+00	0.00E+00	1.12E+00	1.12E+00	4.58E-03	9.87E-01	2.11E+00	6.71E+00	<1	1.86E+01	<1
Selenium	7.50E-01	2.00E-03	0.00E+00	0.00E+00	4.86E-02	4.86E-02	1.64E-04	1.60E-03	5.03E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	3.30E-04	0.00E+00	0.00E+00	1.51E-03	1.51E-03	2.71E-05	3.62E-04	1.90E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.69E+02	2.48E-02	0.00E+00	0.00E+00	1.70E-01	1.70E-01	2.03E-03	3.60E-01	5.33E-01	3.44E-01	1.55E+00	1.70E+00	<1
Zinc	6.70E+01	5.37E-01	0.00E+00	0.00E+00	8.66E+00	8.66E+00	4.40E-02	1.43E-01	8.85E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	4.05E-04	3.14E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	3.98E+02	2.24E+01	0.00E+00	0.00E+00	5.22E-01	5.22E-01	1.84E+00	8.49E-01	3.21E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	3.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.25E-03	7.25E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	5.08E-05	--	5.08E-05				
Fluoranthene	7.10E+01	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-04	1.51E-01	1.52E-01				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Naphthalene	1.80E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-05	3.84E-03	3.91E-03				
Phenanthrene	4.00E+01	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-04	8.53E-02	8.54E-02				
Total LMW PAHs						0.00E+00	1.08E-03	2.48E-01	2.49E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.30E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	9.17E-02	9.19E-02				
Benzo(A)Pyrene	5.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-01	1.13E-01				
Benzo(b)fluoranthene	6.00E+01	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-04	1.28E-01	1.29E-01				
Benzo(g,h,i)perylene	4.30E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	9.17E-02	9.20E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	5.10E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	1.09E-01	1.09E-01				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	8.04E-06	--	8.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	2.54E-04	--	2.54E-04				
Pyrene	6.70E+01	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-04	1.43E-01	1.43E-01				
Total HMW PAHs						0.00E+00	2.88E-03	6.76E-01	6.79E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	1.80E-03	--	1.80E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H3-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	7.70E-03	0.00E+00	4.43E-01	0.00E+00	4.43E-01	1.22E-03	0.00E+00	4.45E-01	No TRV	--	No TRV	--
Arsenic	2.35E+01	4.40E-03	0.00E+00	3.55E-01	0.00E+00	3.55E-01	6.97E-04	0.00E+00	3.56E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.27E+02	2.71E+00	0.00E+00	3.27E+00	0.00E+00	3.27E+00	4.29E-01	0.00E+00	3.70E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	7.20E+00	1.50E-03	0.00E+00	5.13E-02	0.00E+00	5.13E-02	2.37E-04	0.00E+00	5.15E-02	No TRV	--	No TRV	--
Cadmium	9.40E-01	3.00E-03	0.00E+00	1.25E+00	0.00E+00	1.25E+00	4.75E-04	0.00E+00	1.25E+00	1.47E+00	<1	6.35E+00	<1
Chromium	3.92E+01	2.72E-02	0.00E+00	1.90E+00	0.00E+00	1.90E+00	4.31E-03	0.00E+00	1.90E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	1.60E+01	1.55E-02	0.00E+00	3.09E-01	0.00E+00	3.09E-01	2.45E-03	0.00E+00	3.12E-01	7.61E+00	<1	2.02E+01	<1
Copper	5.46E+01	1.83E-01	0.00E+00	4.45E+00	0.00E+00	4.45E+00	2.90E-02	0.00E+00	4.48E+00	4.05E+00	1.11E+00	3.48E+01	<1
Lead	1.94E+01	3.52E-02	0.00E+00	1.39E+00	0.00E+00	1.39E+00	5.57E-03	0.00E+00	1.40E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-01	0.00E+00	5.94E-01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	4.12E-05	--	4.12E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.63E+02	5.59E-02	0.00E+00	5.70E+01	0.00E+00	5.70E+01	8.85E-03	0.00E+00	5.70E+01	6.71E+00	8.50E+00	1.86E+01	3.07E+00
Selenium	7.50E-01	2.00E-03	0.00E+00	1.19E-01	0.00E+00	1.19E-01	3.17E-04	0.00E+00	1.19E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	3.30E-04	0.00E+00	1.46E-03	0.00E+00	1.46E-03	5.22E-05	0.00E+00	1.51E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.69E+02	2.48E-02	0.00E+00	1.12E+00	0.00E+00	1.12E+00	3.93E-03	0.00E+00	1.13E+00	3.44E-01	3.28E+00	1.70E+00	<1
Zinc	6.70E+01	5.37E-01	0.00E+00	5.38E+01	0.00E+00	5.38E+01	8.50E-02	0.00E+00	5.39E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	3.98E+02	2.24E+01	0.00E+00	7.81E+00	0.00E+00	7.81E+00	3.55E+00	0.00E+00	1.14E+01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	3.40E+00	0.00E+00	0.00E+00	7.91E-01	0.00E+00	7.91E-01	0.00E+00	0.00E+00	7.91E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.82E-05	--	9.82E-05				
Fluoranthene	7.10E+01	9.30E-03	0.00E+00	3.42E+01	0.00E+00	3.42E+01	1.47E-03	0.00E+00	3.42E+01				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Naphthalene	1.80E+00	8.70E-04	0.00E+00	1.25E+00	0.00E+00	1.25E+00	1.38E-04	0.00E+00	1.25E+00				
Phenanthrene	4.00E+01	1.50E-03	0.00E+00	1.09E+01	0.00E+00	1.09E+01	2.37E-04	0.00E+00	1.09E+01				
Total LMW PAHs						4.71E+01	2.08E-03	0.00E+00	4.71E+01	1.61E+01	2.93E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.30E+01	3.00E-03	0.00E+00	1.08E+01	0.00E+00	1.08E+01	4.75E-04	0.00E+00	1.08E+01				
Benzo[A]Pyrene	5.30E+01	0.00E+00	0.00E+00	1.12E+01	0.00E+00	1.12E+01	0.00E+00	0.00E+00	1.12E+01				
Benzo(b)fluoranthene	6.00E+01	1.00E-02	0.00E+00	2.47E+01	0.00E+00	2.47E+01	1.58E-03	0.00E+00	2.47E+01				
Benzo(g,h,i)perylene	4.30E+01	3.90E-03	0.00E+00	2.00E+01	0.00E+00	2.00E+01	6.17E-04	0.00E+00	2.00E+01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	5.10E+01	7.60E-03	0.00E+00	1.85E+01	0.00E+00	1.85E+01	1.20E-03	0.00E+00	1.85E+01				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.55E-05	--	1.55E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.91E-04	--	4.91E-04				
Pyrene	6.70E+01	7.00E-03	0.00E+00	1.86E+01	0.00E+00	1.86E+01	1.11E-03	0.00E+00	1.86E+01				
Total HMW PAHs						1.04E+02	5.57E-03	0.00E+00	1.04E+02	2.00E+00	5.19E+01	2.00E+01	5.19E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	3.48E-03	--	3.48E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H3-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-6
Screening-Level Exposure Evaluation - Canada Lynx
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	2.80E+00	7.70E-03	0.00E+00	0.00E+00	4.37E-03	4.37E-03	2.41E-04	2.45E-03	7.06E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.35E+01	4.40E-03	0.00E+00	0.00E+00	3.25E-03	3.25E-03	1.37E-04	2.06E-02	2.39E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.27E+02	2.71E+00	0.00E+00	0.00E+00	4.84E-03	4.84E-03	8.47E-02	1.99E-01	2.88E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	7.20E+00	1.50E-03	0.00E+00	0.00E+00	5.06E-04	5.06E-04	4.69E-05	6.30E-03	6.85E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	9.40E-01	3.00E-03	0.00E+00	0.00E+00	8.63E-03	8.63E-03	9.37E-05	8.22E-04	9.55E-03	7.70E-01	<1	6.87E+00	<1
Chromium	3.92E+01	2.72E-02	0.00E+00	0.00E+00	1.07E-01	1.07E-01	8.50E-04	3.43E-02	1.42E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.60E+01	1.55E-02	0.00E+00	0.00E+00	1.34E-02	1.34E-02	4.84E-04	1.40E-02	2.79E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.46E+01	1.83E-01	0.00E+00	0.00E+00	4.29E-01	4.29E-01	5.72E-03	4.78E-02	4.82E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.94E+01	3.52E-02	0.00E+00	0.00E+00	1.25E-01	1.25E-01	1.10E-03	1.70E-02	1.43E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.17E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	8.12E-06	--	8.12E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.63E+02	5.59E-02	0.00E+00	0.00E+00	4.26E-01	4.26E-01	1.75E-03	4.05E-01	8.33E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.50E-01	2.00E-03	0.00E+00	0.00E+00	1.85E-02	1.85E-02	6.25E-05	6.56E-04	1.92E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.70E-01	3.30E-04	0.00E+00	0.00E+00	5.75E-04	5.75E-04	1.03E-05	1.49E-04	7.34E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.69E+02	2.48E-02	0.00E+00	0.00E+00	6.49E-02	6.49E-02	7.75E-04	1.48E-01	2.14E-01	4.16E+00	<1	9.44E+00	<1
Zinc	6.70E+01	5.37E-01	0.00E+00	0.00E+00	3.30E+00	3.30E+00	1.68E-02	5.86E-02	3.38E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	1.66E-04	1.20E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	3.98E+02	2.24E+01	0.00E+00	0.00E+00	1.99E-01	1.99E-01	7.00E-01	3.48E-01	1.25E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	3.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-03	2.97E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.94E-05	--	1.94E-05				
Fluoranthene	7.10E+01	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-04	6.21E-02	6.24E-02				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Naphthalene	1.80E+00	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-05	1.57E-03	1.60E-03				
Phenanthrene	4.00E+01	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-05	3.50E-02	3.50E-02				
Total LMW PAHs						0.00E+00	4.11E-04	1.02E-01	1.02E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.30E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	3.76E-02	3.77E-02				
Benzo[A]Pyrene	5.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E-02	4.64E-02				
Benzo(b)fluoranthene	6.00E+01	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-04	5.25E-02	5.28E-02				
Benzo(g,h,i)perylene	4.30E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	3.76E-02	3.77E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	5.10E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	4.46E-02	4.49E-02				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	3.06E-06	--	3.06E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.69E-05	--	9.69E-05				
Pyrene	6.70E+01	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-04	5.86E-02	5.88E-02				
Total HMW PAHs						0.00E+00	1.10E-03	2.77E-01	2.78E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	6.87E-04	--	6.87E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H3-6
Screening-Level Exposure Evaluation - Canada Lynx
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
- IR_{diet}

= Ingestion rate of food (kg food ingested per day, dry weight)
- B(S)AF

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- DF_i

= Dietary fraction of food item i (proportion of food type in the diet)
- AUF

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
- BW

= Body weight of the receptor, wet weight (kg)
- ADD_{substrate}

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
- IR_s

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-7
Screening-Level Exposure Evaluation - Grizzly Bear
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	2.80E+00	7.70E-03	1.45E-03	9.07E-03	3.02E-04	0.00E+00	1.08E-02	1.66E-04	1.69E-03	1.10E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.35E+01	4.40E-03	1.24E-02	7.27E-03	2.25E-04	0.00E+00	1.99E-02	9.50E-05	1.42E-02	2.00E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.27E+02	2.71E+00	4.97E-01	6.69E-02	3.35E-04	0.00E+00	5.64E-01	5.85E-02	1.37E-01	6.23E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	7.20E+00	1.50E-03	3.50E-02	1.05E-03	3.50E-05	0.00E+00	3.61E-02	3.24E-05	4.35E-03	3.61E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	9.40E-01	3.00E-03	8.44E-03	2.55E-02	5.97E-04	0.00E+00	3.46E-02	6.48E-05	5.68E-04	3.46E-02	7.70E-01	<1	6.87E+00	<1
Chromium	3.92E+01	2.72E-02	2.26E-02	3.89E-02	7.40E-03	0.00E+00	6.88E-02	5.87E-04	2.37E-02	6.94E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	1.60E+01	1.55E-02	1.68E-03	6.32E-03	9.29E-04	0.00E+00	8.94E-03	3.35E-04	9.67E-03	9.27E-03	7.33E+00	<1	1.89E+01	<1
Copper	5.46E+01	1.83E-01	1.32E-01	9.11E-02	2.97E-02	0.00E+00	2.53E-01	3.95E-03	3.30E-02	2.57E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.94E+01	3.52E-02	1.96E-02	2.85E-02	8.65E-03	0.00E+00	5.68E-02	7.60E-04	1.17E-02	5.76E-02	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.10E-02	0.00E+00	8.10E-02	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	0.00E+00	5.61E-06	--	5.61E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.63E+02	5.59E-02	1.50E-01	1.17E+00	2.94E-02	0.00E+00	1.35E+00	1.21E-03	2.80E-01	1.35E+00	1.70E+00	<1	1.48E+01	<1
Selenium	7.50E-01	2.00E-03	5.19E-03	2.43E-03	1.28E-03	0.00E+00	8.90E-03	4.32E-05	4.54E-04	8.95E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.70E-01	3.30E-04	9.55E-06	2.98E-05	3.97E-05	0.00E+00	7.91E-05	7.13E-06	1.03E-04	8.62E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.69E+02	2.48E-02	1.15E-02	2.30E-02	4.49E-03	0.00E+00	3.90E-02	5.36E-04	1.02E-01	3.95E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.70E+01	5.37E-01	6.97E-01	1.10E+00	2.28E-01	0.00E+00	2.03E+00	1.16E-02	4.05E-02	2.04E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.90E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	1.15E-04	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	3.98E+02	2.24E+01	3.35E-01	1.60E-01	1.38E-02	0.00E+00	5.09E-01	4.84E-01	2.41E-01	9.93E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	3.40E+00	0.00E+00	1.89E-05	1.62E-02	0.00E+00	0.00E+00	1.62E-02	0.00E+00	2.06E-03	1.62E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	0.00E+00	1.34E-05	--	1.34E-05				
Fluoranthene	7.10E+01	9.30E-03	4.98E-01	6.99E-01	0.00E+00	0.00E+00	1.20E+00	2.01E-04	4.29E-02	1.20E+00				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Naphthalene	1.80E+00	8.70E-04	3.08E-01	2.57E-02	0.00E+00	0.00E+00	3.34E-01	1.88E-05	1.09E-03	3.34E-01				
Phenanthrene	4.00E+01	1.50E-03	1.17E-01	2.23E-01	0.00E+00	0.00E+00	3.40E-01	3.24E-05	2.42E-02	3.40E-01				
Total LMW PAHs							1.89E+00	2.84E-04	7.03E-02	1.96E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	4.30E+01	3.00E-03	8.75E-03	2.21E-01	0.00E+00	0.00E+00	2.30E-01	6.48E-05	2.60E-02	2.30E-01				
Benzo(A)Pyrene	5.30E+01	0.00E+00	8.57E-02	2.28E-01	0.00E+00	0.00E+00	3.14E-01	0.00E+00	3.20E-02	3.14E-01				
Benzo(b)fluoranthene	6.00E+01	1.00E-02	2.61E-01	5.05E-01	0.00E+00	0.00E+00	7.66E-01	2.16E-04	3.63E-02	7.67E-01				
Benzo(g,h,i)perylene	4.30E+01	3.90E-03	4.73E-01	4.10E-01	0.00E+00	0.00E+00	8.83E-01	8.42E-05	2.60E-02	8.83E-01				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	5.10E+01	7.60E-03	9.69E-03	3.78E-01	0.00E+00	0.00E+00	3.88E-01	1.64E-04	3.08E-02	3.88E-01				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	0.00E+00	2.12E-06	--	2.12E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	0.00E+00	6.69E-05	--	6.69E-05				
Pyrene	6.70E+01	7.00E-03	6.77E-01	3.80E-01	0.00E+00	0.00E+00	1.06E+00	1.51E-04	4.05E-02	1.06E+00				
Total HMW PAHs							3.64E+00	7.59E-04	1.92E-01	3.83E+00	6.15E-01	6.23E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	0.00E+00	4.75E-04	--	4.75E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H3-7
Screening-Level Exposure Evaluation - Grizzly Bear
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	2.88E+00	7.70E-03	0.00E+00	0.00E+00	7.40E-03	7.40E-03	3.96E-04	2.37E-03	1.02E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.33E+01	4.40E-03	0.00E+00	0.00E+00	5.32E-03	5.32E-03	2.26E-04	1.92E-02	2.47E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.32E+02	2.71E+00	0.00E+00	0.00E+00	8.16E-03	8.16E-03	1.39E-01	1.91E-01	3.39E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	7.58E+00	1.50E-03	0.00E+00	0.00E+00	8.77E-04	8.77E-04	7.72E-05	6.24E-03	7.19E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	3.00E-03	0.00E+00	0.00E+00	1.58E-02	1.58E-02	1.54E-04	9.61E-04	1.69E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.56E+01	2.72E-02	0.00E+00	0.00E+00	1.29E-01	1.29E-01	1.40E-03	2.10E-02	1.51E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.57E+01	1.55E-02	0.00E+00	0.00E+00	2.16E-02	2.16E-02	7.98E-04	1.29E-02	3.53E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.96E+02	1.83E-01	0.00E+00	0.00E+00	9.98E-01	9.98E-01	9.42E-03	4.90E-01	1.50E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.90E+01	3.52E-02	0.00E+00	0.00E+00	2.04E-01	2.04E-01	1.81E-03	1.56E-02	2.21E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.93E-01	0.00E+00	1.93E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	1.41E+00	<1	1.41E+01	<1
Nickel	5.01E+02	5.59E-02	0.00E+00	0.00E+00	7.28E-01	7.28E-01	2.88E-03	4.12E-01	1.14E+00	1.70E+00	<1	1.48E+01	<1
Selenium	4.80E-01	2.00E-03	0.00E+00	0.00E+00	2.58E-02	2.58E-02	1.03E-04	3.95E-04	2.63E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	3.30E-04	0.00E+00	0.00E+00	1.03E-03	1.03E-03	1.70E-05	1.52E-04	1.20E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.65E+02	2.48E-02	0.00E+00	0.00E+00	1.04E-01	1.04E-01	1.28E-03	1.35E-01	2.41E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.82E+01	5.37E-01	0.00E+00	0.00E+00	5.38E+00	5.38E+00	2.76E-02	4.79E-02	5.46E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	1.42E-04	1.96E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.14E+02	2.24E+01	0.00E+00	0.00E+00	5.06E-01	5.06E-01	1.15E+00	5.06E-01	2.16E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.45E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-03	1.19E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	0.00E-05	--	3.19E-05				
Fluoranthene	2.32E+01	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-04	1.91E-02	1.95E-02				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Naphthalene	5.55E-01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-05	4.57E-04	5.02E-04				
Phenanthrene	1.27E+01	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-05	1.05E-02	1.05E-02				
Total LMW PAHs						0.00E+00	6.77E-04	3.12E-02	3.18E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.42E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	1.17E-02	1.18E-02				
Benzo[A]Pyrene	1.79E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-02	1.47E-02				
Benzo(b)fluoranthene	1.97E+01	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	1.62E-02	1.68E-02				
Benzo(g,h,i)perylene	1.54E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	1.27E-02	1.29E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	1.69E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	1.39E-02	1.43E-02				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	5.04E-06	--	5.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	1.60E-04	--	1.60E-04				
Pyrene	2.25E+01	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	1.85E-02	1.88E-02				
Total HMW PAHs						0.00E+00	1.81E-03	8.77E-02	8.95E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	1.13E-03	--	1.13E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H3-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-9
Screening-Level Exposure Evaluation - Meadow Vole
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	2.88E+00	7.70E-03	1.60E-02	0.00E+00	0.00E+00	1.60E-02	1.16E-03	5.62E-03	2.27E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.33E+01	4.40E-03	1.31E-01	0.00E+00	0.00E+00	1.31E-01	6.61E-04	4.55E-02	1.77E-01	1.04E+00	<1	4.55E+00	<1
Barium	2.32E+02	2.71E+00	5.44E+00	0.00E+00	0.00E+00	5.44E+00	4.07E-01	4.54E-01	6.30E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	7.58E+00	1.50E-03	3.89E-01	0.00E+00	0.00E+00	3.89E-01	2.25E-04	1.48E-02	4.04E-01	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	3.00E-03	1.02E-01	0.00E+00	0.00E+00	1.02E-01	4.51E-04	2.28E-03	1.04E-01	7.70E-01	<1	6.87E+00	<1
Chromium	2.56E+01	2.72E-02	1.57E-01	0.00E+00	0.00E+00	1.57E-01	4.09E-03	4.99E-02	2.11E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.57E+01	1.55E-02	1.77E-02	0.00E+00	0.00E+00	1.77E-02	2.33E-03	3.07E-02	5.07E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.96E+02	1.83E-01	3.63E+00	0.00E+00	0.00E+00	3.63E+00	2.75E-02	1.16E+00	4.82E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.90E+01	3.52E-02	2.07E-01	0.00E+00	0.00E+00	2.07E-01	5.29E-03	3.70E-02	2.50E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.63E-01	0.00E+00	5.63E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.91E-05	--	3.91E-05	1.41E+00	<1	1.41E+01	<1
Nickel	5.01E+02	5.59E-02	1.70E+00	0.00E+00	0.00E+00	1.70E+00	8.40E-03	9.78E-01	2.69E+00	1.70E+00	1.58E+00	1.48E+01	<1
Selenium	4.80E-01	2.00E-03	3.40E-02	0.00E+00	0.00E+00	3.40E-02	3.00E-04	9.37E-04	3.52E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	3.30E-04	1.11E-04	0.00E+00	0.00E+00	1.11E-04	4.96E-05	3.61E-04	5.22E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.65E+02	2.48E-02	1.20E-01	0.00E+00	0.00E+00	1.20E-01	3.73E-03	3.21E-01	4.45E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.82E+01	5.37E-01	6.90E+00	0.00E+00	0.00E+00	6.90E+00	8.07E-02	1.14E-01	7.09E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-02	3.37E-04	5.71E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.14E+02	2.24E+01	5.53E+00	0.00E+00	0.00E+00	5.53E+00	3.37E+00	1.20E+00	1.01E+01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.45E+00	0.00E+00	4.20E-04	0.00E+00	0.00E+00	4.20E-04	0.00E+00	2.83E-03	3.25E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Fluoranthene	2.32E+01	9.30E-03	1.74E+00	0.00E+00	0.00E+00	1.74E+00	1.40E-03	4.52E-02	1.79E+00				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Naphthalene	5.55E-01	8.70E-04	1.02E+00	0.00E+00	0.00E+00	1.02E+00	1.31E-04	1.08E-03	1.02E+00				
Phenanthrene	1.27E+01	1.50E-03	6.15E-01	0.00E+00	0.00E+00	6.15E-01	2.25E-04	2.48E-02	6.40E-01				
Total LMW PAHs						3.37E+00	1.98E-03	7.39E-02	3.45E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.42E+01	3.00E-03	4.85E-02	0.00E+00	0.00E+00	4.85E-02	4.51E-04	2.77E-02	7.67E-02				
Benzo(A)Pyrene	1.79E+01	0.00E+00	3.18E-01	0.00E+00	0.00E+00	3.18E-01	0.00E+00	3.50E-02	3.53E-01				
Benzo(b)fluoranthene	1.97E+01	1.00E-02	9.19E-01	0.00E+00	0.00E+00	9.19E-01	1.50E-03	3.85E-02	9.59E-01				
Benzo(g,h,i)perylene	1.54E+01	3.90E-03	1.50E+00	0.00E+00	0.00E+00	1.50E+00	5.86E-04	3.01E-02	1.53E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.91E-05	--	6.91E-05				
Chrysene	1.69E+01	7.60E-03	5.37E-02	0.00E+00	0.00E+00	5.37E-02	1.14E-03	3.30E-02	8.78E-02				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.47E-05	--	1.47E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.66E-04	--	4.66E-04				
Pyrene	2.25E+01	7.00E-03	2.43E+00	0.00E+00	0.00E+00	2.43E+00	1.05E-03	4.38E-02	2.47E+00				
Total HMW PAHs						5.27E+00	5.28E-03	2.08E-01	5.48E+00	6.15E-01	8.92E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	3.31E-03	--	3.31E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H3-9
Screening-Level Exposure Evaluation - Meadow Vole
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-10
Screening-Level Exposure Evaluation - North American Wolverine
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	2.88E+00	7.70E-03	0.00E+00	0.00E+00	4.32E-03	4.32E-03	2.31E-04	2.42E-03	6.97E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.33E+01	4.40E-03	0.00E+00	0.00E+00	3.10E-03	3.10E-03	1.32E-04	1.96E-02	2.28E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.32E+02	2.71E+00	0.00E+00	0.00E+00	4.76E-03	4.76E-03	8.14E-02	1.95E-01	2.82E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	7.58E+00	1.50E-03	0.00E+00	0.00E+00	5.12E-04	5.12E-04	4.51E-05	6.37E-03	6.93E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	3.00E-03	0.00E+00	0.00E+00	9.20E-03	9.20E-03	9.01E-05	9.82E-04	1.03E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.56E+01	2.72E-02	0.00E+00	0.00E+00	7.52E-02	7.52E-02	8.17E-04	2.15E-02	9.76E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	1.57E+01	1.55E-02	0.00E+00	0.00E+00	1.26E-02	1.26E-02	4.66E-04	1.32E-02	2.63E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.96E+02	1.83E-01	0.00E+00	0.00E+00	5.83E-01	5.83E-01	5.50E-03	5.01E-01	1.09E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.90E+01	3.52E-02	0.00E+00	0.00E+00	1.19E-01	1.19E-01	1.06E-03	1.59E-02	1.36E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-01	0.00E+00	1.13E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	7.81E-06	--	7.81E-06	1.41E+00	<1	1.41E+01	<1
Nickel	5.01E+02	5.59E-02	0.00E+00	0.00E+00	4.25E-01	4.25E-01	1.68E-03	4.21E-01	8.48E-01	1.70E+00	<1	1.48E+01	<1
Selenium	4.80E-01	2.00E-03	0.00E+00	0.00E+00	1.50E-02	1.50E-02	6.01E-05	4.04E-04	1.55E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	3.30E-04	0.00E+00	0.00E+00	6.01E-04	6.01E-04	9.92E-06	1.56E-04	7.67E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.65E+02	2.48E-02	0.00E+00	0.00E+00	6.08E-02	6.08E-02	7.45E-04	1.38E-01	2.00E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.82E+01	5.37E-01	0.00E+00	0.00E+00	3.14E+00	3.14E+00	1.61E-02	4.90E-02	3.21E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	1.45E-04	1.15E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.14E+02	2.24E+01	0.00E+00	0.00E+00	2.95E-01	2.95E-01	6.73E-01	5.17E-01	1.48E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.45E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-03	1.22E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.86E-05	--	1.86E-05				
Fluoranthene	2.32E+01	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-04	1.95E-02	1.98E-02				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Naphthalene	5.55E-01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	4.67E-04	4.93E-04				
Phenanthrene	1.27E+01	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	1.07E-02	1.07E-02				
Total LMW PAHs						0.00E+00	3.95E-04	3.18E-02	3.22E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.42E+01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	1.19E-02	1.20E-02				
Benzo[A]Pyrene	1.79E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-02	1.51E-02				
Benzo(b)fluoranthene	1.97E+01	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	1.66E-02	1.69E-02				
Benzo(g,h,i)perylene	1.54E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-04	1.30E-02	1.31E-02				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	1.69E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	1.42E-02	1.44E-02				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	2.94E-06	--	2.94E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Pyrene	2.25E+01	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-04	1.89E-02	1.91E-02				
Total HMW PAHs						0.00E+00	1.06E-03	8.96E-02	9.07E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	6.61E-04	--	6.61E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H3-10
Screening-Level Exposure Evaluation - North American Wolverine
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H3-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	2.88E+00	7.70E-03	0.00E+00	3.85E-01	0.00E+00	3.85E-01	1.03E-03	4.24E-03	3.91E-01	5.90E-02	6.62E+00	2.76E+00	<1
Arsenic	2.33E+01	4.40E-03	0.00E+00	2.99E-01	0.00E+00	2.99E-01	5.90E-04	3.43E-02	3.33E-01	1.04E+00	<1	4.55E+00	<1
Barium	2.32E+02	2.71E+00	0.00E+00	2.83E+00	0.00E+00	2.83E+00	3.63E-01	3.42E-01	3.54E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	7.58E+00	1.50E-03	0.00E+00	4.57E-02	0.00E+00	4.57E-02	2.01E-04	1.12E-02	5.70E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	3.00E-03	0.00E+00	1.26E+00	0.00E+00	1.26E+00	4.02E-04	1.72E-03	1.26E+00	7.70E-01	1.63E+00	6.87E+00	<1
Chromium	2.56E+01	2.72E-02	0.00E+00	1.05E+00	0.00E+00	1.05E+00	3.65E-03	3.77E-02	1.09E+00	2.40E+00	<1	5.82E+01	<1
Cobalt	1.57E+01	1.55E-02	0.00E+00	2.57E-01	0.00E+00	2.57E-01	2.08E-03	2.31E-02	2.82E-01	7.33E+00	<1	1.89E+01	<1
Copper	5.96E+02	1.83E-01	0.00E+00	4.11E+01	0.00E+00	4.11E+01	2.45E-02	8.78E-01	4.20E+01	5.60E+00	7.50E+00	8.27E+01	<1
Lead	1.90E+01	3.52E-02	0.00E+00	1.16E+00	0.00E+00	1.16E+00	4.72E-03	2.79E-02	1.19E+00	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-01	0.00E+00	5.03E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.48E-05	--	3.48E-05	1.41E+00	<1	1.41E+01	<1
Nickel	5.01E+02	5.59E-02	0.00E+00	5.22E+01	0.00E+00	5.22E+01	7.49E-03	7.38E-01	5.29E+01	1.70E+00	3.11E+01	1.48E+01	3.58E+00
Selenium	4.80E-01	2.00E-03	0.00E+00	7.26E-02	0.00E+00	7.26E-02	2.68E-04	7.08E-04	7.36E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	3.30E-04	0.00E+00	1.34E-03	0.00E+00	1.34E-03	4.42E-05	2.73E-04	1.66E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.65E+02	2.48E-02	0.00E+00	9.26E-01	0.00E+00	9.26E-01	3.32E-03	2.42E-01	1.17E+00	4.16E+00	<1	9.44E+00	<1
Zinc	5.82E+01	5.37E-01	0.00E+00	4.35E+01	0.00E+00	4.35E+01	7.20E-02	8.58E-02	4.36E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	2.54E-04	5.09E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	6.14E+02	2.24E+01	0.00E+00	1.02E+01	0.00E+00	1.02E+01	3.00E+00	9.05E-01	1.41E+01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.45E+00	0.00E+00	0.00E+00	2.86E-01	0.00E+00	2.86E-01	0.00E+00	2.14E-03	2.88E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Fluoranthene	2.32E+01	9.30E-03	0.00E+00	9.43E+00	0.00E+00	9.43E+00	1.25E-03	3.41E-02	9.47E+00				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Naphthalene	5.55E-01	8.70E-04	0.00E+00	3.27E-01	0.00E+00	3.27E-01	1.17E-04	8.18E-04	3.28E-01				
Phenanthrene	1.27E+01	1.50E-03	0.00E+00	2.93E+00	0.00E+00	2.93E+00	2.01E-04	1.87E-02	2.95E+00				
Total LMW PAHs						1.30E+01	1.76E-03	5.58E-02	1.30E+01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.42E+01	3.00E-03	0.00E+00	3.03E+00	0.00E+00	3.03E+00	4.02E-04	2.09E-02	3.05E+00				
Benzo[A]Pyrene	1.79E+01	0.00E+00	0.00E+00	3.19E+00	0.00E+00	3.19E+00	0.00E+00	2.64E-02	3.22E+00				
Benzo(b)fluoranthene	1.97E+01	1.00E-02	0.00E+00	6.87E+00	0.00E+00	6.87E+00	1.34E-03	2.91E-02	6.90E+00				
Benzo(g,h,i)perylene	1.54E+01	3.90E-03	0.00E+00	6.07E+00	0.00E+00	6.07E+00	5.23E-04	2.27E-02	6.09E+00				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	1.69E+01	7.60E-03	0.00E+00	5.18E+00	0.00E+00	5.18E+00	1.02E-03	2.49E-02	5.20E+00				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.31E-05	--	1.31E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.15E-04	--	4.15E-04				
Pyrene	2.25E+01	7.00E-03	0.00E+00	5.27E+00	0.00E+00	5.27E+00	9.38E-04	3.31E-02	5.30E+00				
Total HMW PAHs						2.96E+01	4.71E-03	1.57E-01	2.98E+01	6.15E-01	4.84E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	2.95E-03	--	2.95E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H3-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.24E+01	3.75E-02	4.65E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.43E+00	Sample et al. (1999)	Regression ^f	6.17E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	1.06E+03	1.56E-01	1.65E+02	Bechtel-Jacobs (1998a) ^g	9.10E-02	9.65E+01	Sample et al. (1998a)	6.83E-04	7.23E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	7.00E-01	Regression ^a	5.12E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.24E+00	Sample et al. (1999)	Regression ^f	2.40E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	7.30E+00	7.50E-03	5.48E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	8.91E-01	Sample et al. (1998a)	Regression ^f	1.54E-01	Sample et al. (1998b)
Copper	NA	1.83E-01	2.55E+01	Regression ^a	6.99E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.31E+01	Sample et al. (1998a)	Regression ^f	1.23E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	3.62E+01	Regression ^a	1.98E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.46E+01	Sample et al. (1999)	Regression ^f	5.28E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	3.95E+03	7.90E-02	3.12E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.26E+02	Sample et al. (1999)	2.05E-02	8.10E+01	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	1.20E-01	Regression ^a	1.17E-01	Bechtel-Jacobs (1998a)	3.93E+00	4.72E-01	Sample et al. (1998a)	3.81E-01	4.57E-02	LANL (2015)
Nickel	NA	5.59E-02	6.89E+01	Regression ^a	2.57E+00	Bechtel-Jacobs (1998a)	7.78E-01	5.36E+01	Sample et al. (1998a)	Regression ^f	5.61E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	6.40E-01	Regression ^a	3.10E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.69E-01	Sample et al. (1998a)	Regression ^f	5.58E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.50E-01	4.00E-03	6.00E-04	Baes et al. (1984)	5.41E-02	8.12E-03	USCHPPM (2004)	1.08E-01	1.62E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	2.57E+01	4.85E-03	1.25E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	1.08E+00	Sample et al. (1998a)	1.23E-02	3.16E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	1.50E+02	Regression ^a	7.75E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.43E+02	Sample et al. (1998a)	Regression ^f	1.12E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	6.40E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H4-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	1.50E+00	Regression ^a	8.49E-02	USEPA (2007a)	1.59E+00	2.39E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	1.90E+00	Regression ^a	2.38E-01	USEPA (2007a)	1.33E+00	2.53E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	1.50E-01	2.38E-02	3.57E-03	USEPA (2007a)	5.44E+01	8.16E+00	USEPA (2007a)	7.79E-01	1.17E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H4-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H4-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H4-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^g
Antimony	NA	7.70E-03	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^g
Arsenic	NA	4.40E-03	7.98E+00	3.75E-02	2.99E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.05E+00	Sample et al. (1999)	Regression ^f	4.30E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	7.22E+02	1.56E-01	1.13E+02	Bechtel-Jacobs (1998a) ^g	9.10E-02	6.57E+01	Sample et al. (1998a)	6.83E-04	4.92E-01	Baes et al. (1984) ^g
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^g
Cadmium	NA	3.00E-03	2.99E-01	Regression ^a	3.22E-01	Bechtel-Jacobs (1998a)	Regression ^d	3.17E+00	Sample et al. (1999)	Regression ^f	1.61E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	6.20E+00	7.50E-03	4.65E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	7.56E-01	Sample et al. (1998a)	Regression ^f	1.25E-01	Sample et al. (1998b)
Copper	NA	1.83E-01	2.55E+01	Regression ^a	6.99E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.31E+01	Sample et al. (1998a)	Regression ^f	1.23E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	1.69E+01	Regression ^a	1.29E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.86E+00	Sample et al. (1999)	Regression ^f	3.76E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	1.96E+03	7.90E-02	1.54E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	7.82E+01	Sample et al. (1999)	2.05E-02	4.01E+01	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	6.80E-02	Regression ^a	8.56E-02	Bechtel-Jacobs (1998a)	3.93E+00	2.67E-01	Sample et al. (1998a)	3.81E-01	2.59E-02	LANL (2015)
Nickel	NA	5.59E-02	2.70E+01	Regression ^a	1.27E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.10E+01	Sample et al. (1998a)	Regression ^f	3.63E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	6.40E-01	Regression ^a	3.10E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.69E-01	Sample et al. (1998a)	Regression ^f	5.58E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.30E-01	4.00E-03	5.20E-04	Baes et al. (1984)	5.41E-02	7.03E-03	USCHPPM (2004)	1.08E-01	1.41E-02	Baes et al. (1984) ^g
Vanadium	NA	2.48E-02	1.75E+01	4.85E-03	8.46E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.33E-01	Sample et al. (1998a)	1.23E-02	2.15E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	1.07E+02	Regression ^a	6.45E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.97E+02	Sample et al. (1998a)	Regression ^f	1.09E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	4.50E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												

Table H4-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	5.50E-01	Regression ^a	4.67E-02	USEPA (2007a)	1.59E+00	8.75E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	8.50E-01	Regression ^a	1.09E-01	USEPA (2007a)	1.33E+00	1.13E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	2.59E-01	2.38E-02	6.16E-03	USEPA (2007a)	5.44E+01	1.41E+01	USEPA (2007a)	7.79E-01	2.02E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)

Table H4-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H4-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
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Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H4-2
Screening-Level Exposure Evaluation - American Woodcock
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	9.05E-04	--	9.05E-04	No TRV	--	No TRV	--
Arsenic	1.24E+01	4.40E-03	5.47E-03	1.51E-01	0.00E+00	1.56E-01	5.17E-04	1.09E-01	2.66E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.06E+03	2.71E+00	1.94E+00	1.02E+01	0.00E+00	1.21E+01	3.18E-01	9.34E+00	2.18E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04	No TRV	--	No TRV	--
Cadmium	7.00E-01	3.00E-03	6.01E-03	6.59E-01	0.00E+00	6.65E-01	3.52E-04	6.17E-03	6.72E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.20E-03	--	3.20E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	7.30E+00	1.55E-02	6.43E-04	9.42E-02	0.00E+00	9.48E-02	1.82E-03	6.43E-02	1.61E-01	7.61E+00	<1	2.02E+01	<1
Copper	2.55E+01	1.83E-01	8.21E-02	1.39E+00	0.00E+00	1.47E+00	2.15E-02	2.25E-01	1.72E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.62E+01	3.52E-02	2.33E-02	1.54E+00	0.00E+00	1.56E+00	4.14E-03	3.19E-01	1.89E+00	1.63E+00	1.16E+00	4.46E+01	<1
Manganese	3.95E+03	3.75E+00	3.67E+00	1.34E+01	0.00E+00	1.70E+01	4.41E-01	3.48E+01	5.23E+01	1.79E+02	<1	3.77E+02	<1
Mercury	1.20E-01	2.60E-04	1.37E-03	4.99E-02	0.00E+00	5.12E-02	3.05E-05	1.06E-03	5.23E-02	4.50E-01	<1	9.10E-01	<1
Nickel	6.89E+01	5.59E-02	3.02E-02	5.67E+00	0.00E+00	5.70E+00	6.57E-03	6.07E-01	6.31E+00	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	2.00E-03	3.65E-03	7.07E-02	0.00E+00	7.44E-02	2.35E-04	5.64E-03	8.02E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.50E-01	3.30E-04	7.05E-06	8.58E-04	0.00E+00	8.65E-04	3.88E-05	1.32E-03	2.23E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.57E+01	2.48E-02	1.46E-03	1.14E-01	0.00E+00	1.16E-01	2.91E-03	2.26E-01	3.45E-01	3.44E-01	1.00E+00	1.70E+00	<1
Zinc	1.50E+02	5.37E-01	9.11E-01	4.68E+01	0.00E+00	4.77E+01	6.31E-02	1.32E+00	4.91E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	6.40E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	5.64E-03	5.00E-02	4.00E-02	1.25E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.63E+00	--	2.63E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.09E-03	--	1.09E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04				
Total LMW PAHs						0.00E+00	1.55E-03	0.00E+00	1.55E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.50E+00	3.00E-03	9.97E-04	2.52E-01	0.00E+00	2.53E-01	3.52E-04	1.32E-02	2.67E-01				
Benzo[A]Pyrene	1.90E+00	0.00E+00	2.80E-03	2.67E-01	0.00E+00	2.70E-01	0.00E+00	1.67E-02	2.87E-01				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.17E-03	--	1.17E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.58E-04	--	4.58E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.93E-04	--	8.93E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.15E-05	--	1.15E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.64E-04	--	3.64E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	8.22E-04	--	8.22E-04				
Total HMW PAHs						5.23E-01	4.13E-03	3.00E-02	5.57E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	2.20E-02	4.19E-05	8.63E-01	0.00E+00	8.63E-01	2.58E-03	1.32E-03	8.67E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H4-2
Screening-Level Exposure Evaluation - American Woodcock
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-3
Screening-Level Exposure Evaluation - Mourning Dove
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	8.79E-04	--	8.79E-04	No TRV	--	No TRV	--
Arsenic	1.24E+01	4.40E-03	5.31E-02	0.00E+00	0.00E+00	5.31E-02	5.02E-04	9.62E-02	1.50E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.06E+03	2.71E+00	1.89E+01	0.00E+00	0.00E+00	1.89E+01	3.09E-01	8.23E+00	2.74E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04	No TRV	--	No TRV	--
Cadmium	7.00E-01	3.00E-03	5.84E-02	0.00E+00	0.00E+00	5.84E-02	3.42E-04	5.43E-03	6.42E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.10E-03	--	3.10E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	7.30E+00	1.55E-02	6.25E-03	0.00E+00	0.00E+00	6.25E-03	1.77E-03	5.67E-02	6.47E-02	7.61E+00	<1	2.02E+01	<1
Copper	2.55E+01	1.83E-01	7.97E-01	0.00E+00	0.00E+00	7.97E-01	2.09E-02	1.98E-01	1.02E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.62E+01	3.52E-02	2.27E-01	0.00E+00	0.00E+00	2.27E-01	4.02E-03	2.81E-01	5.12E-01	1.63E+00	<1	4.46E+01	<1
Manganese	3.95E+03	3.75E+00	3.56E+01	0.00E+00	0.00E+00	3.56E+01	4.28E-01	3.07E+01	6.67E+01	1.79E+02	<1	3.77E+02	<1
Mercury	1.20E-01	2.60E-04	1.33E-02	0.00E+00	0.00E+00	1.33E-02	2.97E-05	9.31E-04	1.43E-02	4.50E-01	<1	9.10E-01	<1
Nickel	6.89E+01	5.59E-02	2.93E-01	0.00E+00	0.00E+00	2.93E-01	6.38E-03	5.35E-01	8.34E-01	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	2.00E-03	3.54E-02	0.00E+00	0.00E+00	3.54E-02	2.28E-04	4.97E-03	4.06E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.50E-01	3.30E-04	6.85E-05	0.00E+00	0.00E+00	6.85E-05	3.77E-05	1.16E-03	1.27E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.57E+01	2.48E-02	1.42E-02	0.00E+00	0.00E+00	1.42E-02	2.83E-03	1.99E-01	2.17E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.50E+02	5.37E-01	8.85E+00	0.00E+00	0.00E+00	8.85E+00	6.13E-02	1.16E+00	1.01E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	6.40E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	4.97E-03	4.81E-02	4.00E-02	1.20E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.56E+00	--	2.56E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.08E-05	--	7.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.06E-03	--	1.06E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04				
Total LMW PAHs						0.00E+00	1.50E-03	0.00E+00	1.50E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.50E+00	3.00E-03	9.69E-03	0.00E+00	0.00E+00	9.69E-03	3.42E-04	1.16E-02	2.17E-02				
Benzo(A)Pyrene	1.90E+00	0.00E+00	2.72E-02	0.00E+00	0.00E+00	2.72E-02	0.00E+00	1.47E-02	4.19E-02				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.45E-04	--	4.45E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.67E-04	--	8.67E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.12E-05	--	1.12E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.54E-04	--	3.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	7.99E-04	--	7.99E-04				
Total HMW PAHs						3.68E-02	4.01E-03	2.64E-02	6.72E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	2.20E-02	4.07E-04	0.00E+00	0.00E+00	4.07E-04	2.51E-03	1.16E-03	4.08E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H4-3
Screening-Level Exposure Evaluation - Mourning Dove
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	6.31E-04	--	6.31E-04	No TRV	--	No TRV	--
Arsenic	1.24E+01	4.40E-03	0.00E+00	0.00E+00	5.06E-03	5.06E-03	3.61E-04	2.64E-02	3.19E-02	2.24E+00	<1	4.51E+00	<1
Barium	1.06E+03	2.71E+00	0.00E+00	0.00E+00	5.93E-02	5.93E-02	2.22E-01	2.26E+00	2.54E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04	No TRV	--	No TRV	--
Cadmium	7.00E-01	3.00E-03	0.00E+00	0.00E+00	1.97E-02	1.97E-02	2.46E-04	1.49E-03	2.15E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	2.23E-03	--	2.23E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	7.30E+00	1.55E-02	0.00E+00	0.00E+00	1.27E-02	1.27E-02	1.27E-03	1.56E-02	2.95E-02	7.61E+00	<1	2.02E+01	<1
Copper	2.55E+01	1.83E-01	0.00E+00	0.00E+00	1.01E+00	1.01E+00	1.50E-02	5.44E-02	1.08E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.62E+01	3.52E-02	0.00E+00	0.00E+00	4.33E-01	4.33E-01	2.89E-03	7.72E-02	5.13E-01	1.63E+00	<1	4.46E+01	<1
Manganese	3.95E+03	3.75E+00	0.00E+00	0.00E+00	6.64E+00	6.64E+00	3.08E-01	8.42E+00	1.54E+01	1.79E+02	<1	3.77E+02	<1
Mercury	1.20E-01	2.60E-04	0.00E+00	0.00E+00	3.75E-03	3.75E-03	2.13E-05	2.56E-04	4.03E-03	4.50E-01	<1	9.10E-01	<1
Nickel	6.89E+01	5.59E-02	0.00E+00	0.00E+00	4.60E-01	4.60E-01	4.58E-03	1.47E-01	6.12E-01	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	2.00E-03	0.00E+00	0.00E+00	4.57E-02	4.57E-02	1.64E-04	1.36E-03	4.73E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.50E-01	3.30E-04	0.00E+00	0.00E+00	1.33E-03	1.33E-03	2.71E-05	3.20E-04	1.68E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.57E+01	2.48E-02	0.00E+00	0.00E+00	2.59E-02	2.59E-02	2.03E-03	5.48E-02	8.28E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.50E+02	5.37E-01	0.00E+00	0.00E+00	9.17E+00	9.17E+00	4.40E-02	3.20E-01	9.53E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	6.40E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	1.36E-03	3.24E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.84E+00	--	1.84E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	5.08E-05	--	5.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	7.63E-04	--	7.63E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04				
Total LMW PAHs						0.00E+00	1.08E-03	0.00E+00	1.08E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.50E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	3.20E-03	3.44E-03				
Benzo(A)Pyrene	1.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-03	4.05E-03				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	8.20E-04	--	8.20E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	3.20E-04	--	3.20E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	6.23E-04	--	6.23E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	8.04E-06	--	8.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	2.54E-04	--	2.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	5.74E-04	--	5.74E-04				
Total HMW PAHs						0.00E+00	2.88E-03	7.25E-03	1.01E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	2.20E-02	0.00E+00	0.00E+00	9.58E-03	9.58E-03	1.80E-03	3.20E-04	1.17E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H4-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.22E-03	--	1.22E-03	No TRV	--	No TRV	--
Arsenic	1.24E+01	4.40E-03	0.00E+00	2.26E-01	0.00E+00	2.26E-01	6.97E-04	0.00E+00	2.27E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.06E+03	2.71E+00	0.00E+00	1.53E+01	0.00E+00	1.53E+01	4.29E-01	0.00E+00	1.57E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04	No TRV	--	No TRV	--
Cadmium	7.00E-01	3.00E-03	0.00E+00	9.87E-01	0.00E+00	9.87E-01	4.75E-04	0.00E+00	9.88E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.31E-03	--	4.31E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	7.30E+00	1.55E-02	0.00E+00	1.41E-01	0.00E+00	1.41E-01	2.45E-03	0.00E+00	1.43E-01	7.61E+00	<1	2.02E+01	<1
Copper	2.55E+01	1.83E-01	0.00E+00	2.08E+00	0.00E+00	2.08E+00	2.90E-02	0.00E+00	2.11E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.62E+01	3.52E-02	0.00E+00	2.31E+00	0.00E+00	2.31E+00	5.57E-03	0.00E+00	2.31E+00	1.63E+00	1.42E+00	4.46E+01	<1
Manganese	3.95E+03	3.75E+00	0.00E+00	2.00E+01	0.00E+00	2.00E+01	5.94E-01	0.00E+00	2.06E+01	1.79E+02	<1	3.77E+02	<1
Mercury	1.20E-01	2.60E-04	0.00E+00	7.47E-02	0.00E+00	7.47E-02	4.12E-05	0.00E+00	7.47E-02	4.50E-01	<1	9.10E-01	<1
Nickel	6.89E+01	5.59E-02	0.00E+00	8.49E+00	0.00E+00	8.49E+00	8.85E-03	0.00E+00	8.49E+00	6.71E+00	1.27E+00	1.86E+01	<1
Selenium	6.40E-01	2.00E-03	0.00E+00	1.06E-01	0.00E+00	1.06E-01	3.17E-04	0.00E+00	1.06E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.50E-01	3.30E-04	0.00E+00	1.28E-03	0.00E+00	1.28E-03	5.22E-05	0.00E+00	1.34E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.57E+01	2.48E-02	0.00E+00	1.71E-01	0.00E+00	1.71E-01	3.93E-03	0.00E+00	1.75E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.50E+02	5.37E-01	0.00E+00	7.01E+01	0.00E+00	7.01E+01	8.50E-02	0.00E+00	7.02E+01	6.61E+01	1.06E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	6.40E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.55E+00	--	3.55E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.82E-05	--	9.82E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.47E-03	--	1.47E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Total LMW PAHs						0.00E+00	2.08E-03	0.00E+00	2.08E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.50E+00	3.00E-03	0.00E+00	3.78E-01	0.00E+00	3.78E-01	4.75E-04	0.00E+00	3.78E-01				
Benzo[A]Pyrene	1.90E+00	0.00E+00	0.00E+00	4.00E-01	0.00E+00	4.00E-01	0.00E+00	0.00E+00	4.00E-01				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.58E-03	--	1.58E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	6.17E-04	--	6.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.20E-03	--	1.20E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.55E-05	--	1.55E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.91E-04	--	4.91E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.11E-03	--	1.11E-03				
Total HMW PAHs						7.78E-01	5.57E-03	0.00E+00	7.83E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	2.20E-02	0.00E+00	1.29E+00	0.00E+00	1.29E+00	3.48E-03	0.00E+00	1.30E+00	1.10E+00	1.18E+00	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H4-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-6
Screening-Level Exposure Evaluation - Canada Lynx
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	2.41E-04	--	2.41E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.24E+01	4.40E-03	0.00E+00	0.00E+00	1.93E-03	1.93E-03	1.37E-04	1.08E-02	1.29E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.06E+03	2.71E+00	0.00E+00	0.00E+00	2.26E-02	2.26E-02	8.47E-02	9.27E-01	1.03E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	7.00E-01	3.00E-03	0.00E+00	0.00E+00	7.51E-03	7.51E-03	9.37E-05	6.12E-04	8.22E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.50E-04	--	8.50E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	7.30E+00	1.55E-02	0.00E+00	0.00E+00	4.82E-03	4.82E-03	4.84E-04	6.39E-03	1.17E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.55E+01	1.83E-01	0.00E+00	0.00E+00	3.84E-01	3.84E-01	5.72E-03	2.23E-02	4.12E-01	5.60E+00	<1	8.27E+01	<1
Lead	3.62E+01	3.52E-02	0.00E+00	0.00E+00	1.65E-01	1.65E-01	1.10E-03	3.17E-02	1.98E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.95E+03	3.75E+00	0.00E+00	0.00E+00	2.53E+00	2.53E+00	1.17E-01	3.46E+00	6.10E+00	5.15E+01	<1	1.46E+02	<1
Mercury	1.20E-01	2.60E-04	0.00E+00	0.00E+00	1.43E-03	1.43E-03	8.12E-06	1.05E-04	1.54E-03	1.41E+00	<1	1.41E+01	<1
Nickel	6.89E+01	5.59E-02	0.00E+00	0.00E+00	1.75E-01	1.75E-01	1.75E-03	6.03E-02	2.37E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	2.00E-03	0.00E+00	0.00E+00	1.74E-02	1.74E-02	6.25E-05	5.60E-04	1.81E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.50E-01	3.30E-04	0.00E+00	0.00E+00	5.07E-04	5.07E-04	1.03E-05	1.31E-04	6.49E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	2.57E+01	2.48E-02	0.00E+00	0.00E+00	9.88E-03	9.88E-03	7.75E-04	2.25E-02	3.31E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.50E+02	5.37E-01	0.00E+00	0.00E+00	3.49E+00	3.49E+00	1.68E-02	1.31E-01	3.64E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	6.40E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	5.60E-04	1.24E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	7.00E-01	--	7.00E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.94E-05	--	1.94E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05				
Total LMW PAHs						0.00E+00	4.11E-04	0.00E+00	4.11E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.50E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	1.31E-03	1.41E-03				
Benzo[A]Pyrene	1.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-03	1.66E-03				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.12E-04	--	3.12E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.22E-04	--	1.22E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	3.06E-06	--	3.06E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.69E-05	--	9.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.19E-04	--	2.19E-04				
Total HMW PAHs						0.00E+00	1.10E-03	2.97E-03	4.07E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	2.20E-02	0.00E+00	0.00E+00	3.65E-03	3.65E-03	6.87E-04	1.31E-04	4.47E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H4-6
Screening-Level Exposure Evaluation - Canada Lynx
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-7
Screening-Level Exposure Evaluation - Grizzly Bear
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	0.00E+00	1.66E-04	--	1.66E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.24E+01	4.40E-03	6.53E-03	4.63E-03	1.33E-04	0.00E+00	1.13E-02	9.50E-05	7.50E-03	1.14E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.06E+03	2.71E+00	2.32E+00	3.12E-01	1.56E-03	0.00E+00	2.64E+00	5.85E-02	6.41E-01	2.69E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	7.00E-01	3.00E-03	7.18E-03	2.02E-02	5.19E-04	0.00E+00	2.79E-02	6.48E-05	4.23E-04	2.80E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	0.00E+00	5.87E-04	--	5.87E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	7.30E+00	1.55E-02	7.69E-04	2.88E-03	3.33E-04	0.00E+00	3.99E-03	3.35E-04	4.41E-03	4.32E-03	7.33E+00	<1	1.89E+01	<1
Copper	2.55E+01	1.83E-01	9.81E-02	4.25E-02	2.66E-02	0.00E+00	1.67E-01	3.95E-03	1.54E-02	1.71E-01	5.60E+00	<1	8.27E+01	<1
Lead	3.62E+01	3.52E-02	2.79E-02	4.72E-02	1.14E-02	0.00E+00	8.64E-02	7.60E-04	2.19E-02	8.72E-02	4.70E+00	<1	1.86E+02	<1
Manganese	3.95E+03	3.75E+00	4.38E+00	4.09E-01	1.75E-01	0.00E+00	4.96E+00	8.10E-02	2.39E+00	5.05E+00	5.15E+01	<1	1.46E+02	<1
Mercury	1.20E-01	2.60E-04	1.64E-03	1.53E-03	9.87E-05	0.00E+00	3.26E-03	5.61E-06	7.26E-05	3.27E-03	1.41E+00	<1	1.41E+01	<1
Nickel	6.89E+01	5.59E-02	3.60E-02	1.74E-01	1.21E-02	0.00E+00	2.22E-01	1.21E-03	4.17E-02	2.23E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	2.00E-03	4.36E-03	2.17E-03	1.20E-03	0.00E+00	7.73E-03	4.32E-05	3.87E-04	7.77E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.50E-01	3.30E-04	8.42E-06	2.63E-05	3.50E-05	0.00E+00	6.98E-05	7.13E-06	9.07E-05	7.69E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.57E+01	2.48E-02	1.75E-03	3.50E-03	6.83E-04	0.00E+00	5.93E-03	5.36E-04	1.55E-02	6.46E-03	4.16E+00	<1	9.44E+00	<1
Zinc	1.50E+02	5.37E-01	1.09E+00	1.43E+00	2.41E-01	0.00E+00	2.76E+00	1.16E-02	9.07E-02	2.78E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	6.40E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	3.87E-04	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	0.00E+00	4.84E-01	--	4.84E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	0.00E+00	1.34E-05	--	1.34E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05				
Total LMW PAHs							0.00E+00	2.84E-04	0.00E+00	2.84E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.50E+00	3.00E-03	1.19E-03	7.73E-03	0.00E+00	0.00E+00	8.92E-03	6.48E-05	9.07E-04	8.98E-03				
Benzo(a)Pyrene	1.90E+00	0.00E+00	3.34E-03	8.19E-03	0.00E+00	0.00E+00	1.15E-02	0.00E+00	1.15E-03	1.15E-02				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	0.00E+00	2.16E-04	--	2.16E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	0.00E+00	8.42E-05	--	8.42E-05				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	0.00E+00	1.64E-04	--	1.64E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	0.00E+00	2.12E-06	--	2.12E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	0.00E+00	6.69E-05	--	6.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	0.00E+00	1.51E-04	--	1.51E-04				
Total HMW PAHs							2.04E-02	7.59E-04	2.06E-03	2.33E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	2.20E-02	5.01E-05	2.64E-02	2.52E-04	0.00E+00	2.67E-02	4.75E-04	9.07E-05	2.72E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H4-7
Screening-Level Exposure Evaluation - Grizzly Bear
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	3.96E-04	--	3.96E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	7.98E+00	4.40E-03	0.00E+00	0.00E+00	2.21E-03	2.21E-03	2.26E-04	6.57E-03	9.00E-03	1.04E+00	<1	4.55E+00	<1
Barium	7.22E+02	2.71E+00	0.00E+00	0.00E+00	2.53E-02	2.53E-02	1.39E-01	5.94E-01	7.59E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.99E-01	3.00E-03	0.00E+00	0.00E+00	8.27E-03	8.27E-03	1.54E-04	2.46E-04	8.67E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	1.40E-03	--	1.40E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	6.20E+00	1.55E-02	0.00E+00	0.00E+00	6.41E-03	6.41E-03	7.98E-04	5.10E-03	1.23E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.55E+01	1.83E-01	0.00E+00	0.00E+00	6.33E-01	6.33E-01	9.42E-03	2.10E-02	6.63E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.69E+01	3.52E-02	0.00E+00	0.00E+00	1.94E-01	1.94E-01	1.81E-03	1.39E-02	2.09E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.96E+03	3.75E+00	0.00E+00	0.00E+00	2.06E+00	2.06E+00	1.93E-01	1.61E+00	3.87E+00	5.15E+01	<1	1.46E+02	<1
Mercury	6.80E-02	2.60E-04	0.00E+00	0.00E+00	1.33E-03	1.33E-03	1.34E-05	5.60E-05	1.40E-03	1.41E+00	<1	1.41E+01	<1
Nickel	2.70E+01	5.59E-02	0.00E+00	0.00E+00	1.87E-01	1.87E-01	2.88E-03	2.22E-02	2.12E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	2.00E-03	0.00E+00	0.00E+00	2.87E-02	2.87E-02	1.03E-04	5.27E-04	2.93E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.30E-01	3.30E-04	0.00E+00	0.00E+00	7.24E-04	7.24E-04	1.70E-05	1.07E-04	8.48E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.75E+01	2.48E-02	0.00E+00	0.00E+00	1.10E-02	1.10E-02	1.28E-03	1.44E-02	2.67E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.07E+02	5.37E-01	0.00E+00	0.00E+00	5.62E+00	5.62E+00	2.76E-02	8.85E-02	5.74E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.50E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	3.71E-04	1.98E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.15E+00	--	1.15E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	3.19E-05	--	3.19E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	4.79E-04	--	4.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05				
Total LMW PAHs						0.00E+00	6.77E-04	0.00E+00	6.77E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.50E-01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	4.53E-04	6.07E-04				
Benzo[A]Pyrene	8.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-04	7.00E-04				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	5.15E-04	--	5.15E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	3.91E-04	--	3.91E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	5.04E-06	--	5.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	1.60E-04	--	1.60E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	3.60E-04	--	3.60E-04				
Total HMW PAHs						0.00E+00	1.81E-03	1.15E-03	2.96E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.59E-01	2.20E-02	0.00E+00	0.00E+00	1.04E-02	1.04E-02	1.13E-03	2.13E-04	1.17E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H4-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-9
Screening-Level Exposure Evaluation - Meadow Vole
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.16E-03	--	1.16E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	7.98E+00	4.40E-03	4.50E-02	0.00E+00	0.00E+00	4.50E-02	6.61E-04	1.56E-02	6.12E-02	1.04E+00	<1	4.55E+00	<1
Barium	7.22E+02	2.71E+00	1.69E+01	0.00E+00	0.00E+00	1.69E+01	4.07E-01	1.41E+00	1.87E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	2.99E-01	3.00E-03	4.83E-02	0.00E+00	0.00E+00	4.83E-02	4.51E-04	5.83E-04	4.93E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.09E-03	--	4.09E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	6.20E+00	1.55E-02	6.99E-03	0.00E+00	0.00E+00	6.99E-03	2.33E-03	1.21E-02	2.14E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.55E+01	1.83E-01	1.05E+00	0.00E+00	0.00E+00	1.05E+00	2.75E-02	4.98E-02	1.13E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.69E+01	3.52E-02	1.94E-01	0.00E+00	0.00E+00	1.94E-01	5.29E-03	3.29E-02	2.32E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.96E+03	3.75E+00	2.32E+01	0.00E+00	0.00E+00	2.32E+01	5.63E-01	3.82E+00	2.76E+01	5.15E+01	<1	1.46E+02	<1
Mercury	6.80E-02	2.60E-04	1.29E-02	0.00E+00	0.00E+00	1.29E-02	3.91E-05	1.33E-04	1.30E-02	1.41E+00	<1	1.41E+01	<1
Nickel	2.70E+01	5.59E-02	1.91E-01	0.00E+00	0.00E+00	1.91E-01	8.40E-03	5.27E-02	2.52E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	2.00E-03	4.66E-02	0.00E+00	0.00E+00	4.66E-02	3.00E-04	1.25E-03	4.82E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.30E-01	3.30E-04	7.81E-05	0.00E+00	0.00E+00	7.81E-05	4.96E-05	2.54E-04	3.82E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.75E+01	2.48E-02	1.27E-02	0.00E+00	0.00E+00	1.27E-02	3.73E-03	3.41E-02	5.05E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.07E+02	5.37E-01	9.69E+00	0.00E+00	0.00E+00	9.69E+00	8.07E-02	2.10E-01	9.98E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.50E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-02	8.79E-04	5.77E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.37E+00	--	3.37E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.40E-03	--	1.40E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04				
Total LMW PAHs						0.00E+00	1.98E-03	0.00E+00	1.98E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.50E-01	3.00E-03	7.02E-03	0.00E+00	0.00E+00	7.02E-03	4.51E-04	1.07E-03	8.55E-03				
Benzo[A]Pyrene	8.50E-01	0.00E+00	1.63E-02	0.00E+00	0.00E+00	1.63E-02	0.00E+00	1.66E-03	1.80E-02				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.50E-03	--	1.50E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.86E-04	--	5.86E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.91E-05	--	6.91E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.47E-05	--	1.47E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.66E-04	--	4.66E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.05E-03	--	1.05E-03				
Total HMW PAHs						2.33E-02	5.28E-03	2.73E-03	3.14E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.59E-01	2.20E-02	9.26E-04	0.00E+00	0.00E+00	9.26E-04	3.31E-03	5.06E-04	4.74E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H4-9
Screening-Level Exposure Evaluation - Meadow Vole
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-10
Screening-Level Exposure Evaluation - North American Wolverine
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	2.31E-04	--	2.31E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	7.98E+00	4.40E-03	0.00E+00	0.00E+00	1.29E-03	1.29E-03	1.32E-04	6.71E-03	8.13E-03	1.04E+00	<1	4.55E+00	<1
Barium	7.22E+02	2.71E+00	0.00E+00	0.00E+00	1.48E-02	1.48E-02	8.14E-02	6.07E-01	7.03E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.99E-01	3.00E-03	0.00E+00	0.00E+00	4.83E-03	4.83E-03	9.01E-05	2.51E-04	5.17E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.17E-04	--	8.17E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	6.20E+00	1.55E-02	0.00E+00	0.00E+00	3.75E-03	3.75E-03	4.66E-04	5.22E-03	9.43E-03	7.33E+00	<1	1.89E+01	<1
Copper	2.55E+01	1.83E-01	0.00E+00	0.00E+00	3.70E-01	3.70E-01	5.50E-03	2.15E-02	3.97E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.69E+01	3.52E-02	0.00E+00	0.00E+00	1.13E-01	1.13E-01	1.06E-03	1.42E-02	1.28E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.96E+03	3.75E+00	0.00E+00	0.00E+00	1.20E+00	1.20E+00	1.13E-01	1.64E+00	2.96E+00	5.15E+01	<1	1.46E+02	<1
Mercury	6.80E-02	2.60E-04	0.00E+00	0.00E+00	7.78E-04	7.78E-04	7.81E-06	5.72E-05	8.43E-04	1.41E+00	<1	1.41E+01	<1
Nickel	2.70E+01	5.59E-02	0.00E+00	0.00E+00	1.09E-01	1.09E-01	1.68E-03	2.27E-02	1.33E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	2.00E-03	0.00E+00	0.00E+00	1.68E-02	1.68E-02	6.01E-05	5.38E-04	1.74E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.30E-01	3.30E-04	0.00E+00	0.00E+00	4.23E-04	4.23E-04	9.92E-06	1.09E-04	5.42E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.75E+01	2.48E-02	0.00E+00	0.00E+00	6.45E-03	6.45E-03	7.45E-04	1.47E-02	2.19E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.07E+02	5.37E-01	0.00E+00	0.00E+00	3.28E+00	3.28E+00	1.61E-02	9.04E-02	3.39E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.50E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	3.79E-04	1.17E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	6.73E-01	--	6.73E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.86E-05	--	1.86E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05				
Total LMW PAHs						0.00E+00	3.95E-04	0.00E+00	3.95E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.50E-01	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	4.63E-04	5.53E-04				
Benzo[A]Pyrene	8.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.15E-04	7.15E-04				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.00E-04	--	3.00E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	2.94E-06	--	2.94E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.10E-04	--	2.10E-04				
Total HMW PAHs						0.00E+00	1.06E-03	1.18E-03	2.23E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.59E-01	2.20E-02	0.00E+00	0.00E+00	6.06E-03	6.06E-03	6.61E-04	2.18E-04	6.94E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H4-10
Screening-Level Exposure Evaluation - North American Wolverine
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H4-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.03E-03	--	1.03E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	7.98E+00	4.40E-03	0.00E+00	1.40E-01	0.00E+00	1.40E-01	5.90E-04	1.18E-02	1.53E-01	1.04E+00	<1	4.55E+00	<1
Barium	7.22E+02	2.71E+00	0.00E+00	8.80E+00	0.00E+00	8.80E+00	3.63E-01	1.06E+00	1.02E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	2.99E-01	3.00E-03	0.00E+00	4.25E-01	0.00E+00	4.25E-01	4.02E-04	4.40E-04	4.26E-01	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.65E-03	--	3.65E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	6.20E+00	1.55E-02	0.00E+00	1.01E-01	0.00E+00	1.01E-01	2.08E-03	9.14E-03	1.13E-01	7.33E+00	<1	1.89E+01	<1
Copper	2.55E+01	1.83E-01	0.00E+00	1.76E+00	0.00E+00	1.76E+00	2.45E-02	3.76E-02	1.82E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.69E+01	3.52E-02	0.00E+00	1.05E+00	0.00E+00	1.05E+00	4.72E-03	2.48E-02	1.08E+00	4.70E+00	<1	1.86E+02	<1
Manganese	1.96E+03	3.75E+00	0.00E+00	1.05E+01	0.00E+00	1.05E+01	5.03E-01	2.88E+00	1.39E+01	5.15E+01	<1	1.46E+02	<1
Mercury	6.80E-02	2.60E-04	0.00E+00	3.58E-02	0.00E+00	3.58E-02	3.48E-05	1.00E-04	3.59E-02	1.41E+00	<1	1.41E+01	<1
Nickel	2.70E+01	5.59E-02	0.00E+00	2.81E+00	0.00E+00	2.81E+00	7.49E-03	3.98E-02	2.86E+00	1.70E+00	1.68E+00	1.48E+01	<1
Selenium	6.40E-01	2.00E-03	0.00E+00	8.96E-02	0.00E+00	8.96E-02	2.68E-04	9.43E-04	9.09E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.30E-01	3.30E-04	0.00E+00	9.43E-04	0.00E+00	9.43E-04	4.42E-05	1.92E-04	1.18E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.75E+01	2.48E-02	0.00E+00	9.82E-02	0.00E+00	9.82E-02	3.32E-03	2.57E-02	1.27E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.07E+02	5.37E-01	0.00E+00	5.32E+01	0.00E+00	5.32E+01	7.20E-02	1.58E-01	5.34E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.50E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	6.63E-04	5.13E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.00E+00	--	3.00E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.25E-03	--	1.25E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Total LMW PAHs						0.00E+00	1.76E-03	0.00E+00	1.76E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.50E-01	3.00E-03	0.00E+00	1.17E-01	0.00E+00	1.17E-01	4.02E-04	8.11E-04	1.18E-01				
Benzo(A)Pyrene	8.50E-01	0.00E+00	0.00E+00	1.52E-01	0.00E+00	1.52E-01	0.00E+00	1.25E-03	1.53E-01				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.34E-03	--	1.34E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.23E-04	--	5.23E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.02E-03	--	1.02E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.31E-05	--	1.31E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.15E-04	--	4.15E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	9.38E-04	--	9.38E-04				
Total HMW PAHs						2.69E-01	4.71E-03	2.06E-03	2.75E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.59E-01	2.20E-02	0.00E+00	1.89E+00	0.00E+00	1.89E+00	2.95E-03	3.82E-04	1.89E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H4-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
- IR_{diet}

= Ingestion rate of food (kg food ingested per day, dry weight)
- B(S)AF

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- DF_i

= Dietary fraction of food item i (proportion of food type in the diet)
- AUF

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
- BW

= Body weight of the receptor, wet weight (kg)
- ADD_{substrate}

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
- IR_s

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.53E+01	3.75E-02	5.74E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.66E+00	Sample et al. (1999)	Regression ^f	7.33E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	4.82E+02	1.56E-01	7.52E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	4.39E+01	Sample et al. (1998a)	6.83E-04	3.29E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	3.90E-01	Regression ^a	3.72E-01	Bechtel-Jacobs (1998a)	Regression ^d	3.92E+00	Sample et al. (1999)	Regression ^f	1.82E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	8.60E+00	7.50E-03	6.45E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.05E+00	Sample et al. (1998a)	Regression ^f	1.91E-01	Sample et al. (1998b)
Copper	NA	1.83E-01	2.67E+01	Regression ^a	7.11E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.38E+01	Sample et al. (1998a)	Regression ^f	1.24E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	2.18E+01	Regression ^a	1.49E+00	Bechtel-Jacobs (1998a)	Regression ^d	9.67E+00	Sample et al. (1999)	Regression ^f	4.22E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	2.62E+03	7.90E-02	2.07E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	9.55E+01	Sample et al. (1999)	2.05E-02	5.37E+01	Sample et al. (1998b) ^j
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.90E-01	4.00E-03	7.60E-04	Baes et al. (1984)	5.41E-02	1.03E-02	USCHPPM (2004)	1.08E-01	2.06E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	2.04E+01	4.85E-03	9.89E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	8.57E-01	Sample et al. (1998a)	1.23E-02	2.51E-01	Sample et al. (1998b) ^j
Zinc	NA	5.37E-01	1.16E+02	Regression ^a	6.73E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.07E+02	Sample et al. (1998a)	Regression ^f	1.10E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	4.20E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												

Table H5-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	6.60E-01	2.38E-02	1.57E-02	USEPA (2007a)	5.44E+01	3.59E+01	USEPA (2007a)	7.79E-01	5.14E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)

Table H5-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H5-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H5-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.34E+01	3.75E-02	5.03E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.51E+00	Sample et al. (1999)	Regression ^f	6.57E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	4.72E+02	1.56E-01	7.37E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	4.30E+01	Sample et al. (1998a)	6.83E-04	3.22E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	2.14E-01	Regression ^a	2.68E-01	Bechtel-Jacobs (1998a)	Regression ^d	2.43E+00	Sample et al. (1999)	Regression ^f	1.37E-01	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	8.50E+00	7.50E-03	6.38E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.04E+00	Sample et al. (1998a)	Regression ^f	1.88E-01	Sample et al. (1998b)
Copper	NA	1.83E-01	2.20E+01	Regression ^a	6.60E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.13E+01	Sample et al. (1998a)	Regression ^f	1.20E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	2.04E+01	Regression ^a	1.44E+00	Bechtel-Jacobs (1998a)	Regression ^d	9.15E+00	Sample et al. (1999)	Regression ^f	4.09E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	9.50E+02	7.90E-02	7.50E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	4.78E+01	Sample et al. (1999)	2.05E-02	1.95E+01	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	1.13E-01	4.00E-03	4.50E-04	Baes et al. (1984)	5.41E-02	6.09E-03	USCHPPM (2004)	1.08E-01	1.22E-02	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	1.88E+01	4.85E-03	9.13E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.91E-01	Sample et al. (1998a)	1.23E-02	2.32E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	1.15E+02	Regression ^a	6.69E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.06E+02	Sample et al. (1998a)	Regression ^f	1.10E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	2.80E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												

Table H5-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	5.33E-01	2.38E-02	1.27E-02	USEPA (2007a)	5.44E+01	2.90E+01	USEPA (2007a)	7.79E-01	4.15E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)

Table H5-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H5-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H5-2
Screening-Level Exposure Evaluation - American Woodcock
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	9.05E-04	--	9.05E-04	No TRV	--	No TRV	--
Arsenic	1.53E+01	4.40E-03	6.74E-03	1.75E-01	0.00E+00	1.82E-01	5.17E-04	1.35E-01	3.17E-01	2.24E+00	<1	4.51E+00	<1
Barium	4.82E+02	2.71E+00	8.83E-01	4.64E+00	0.00E+00	5.52E+00	3.18E-01	4.25E+00	1.01E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04	No TRV	--	No TRV	--
Cadmium	3.90E-01	3.00E-03	4.37E-03	4.14E-01	0.00E+00	4.19E-01	3.52E-04	3.44E-03	4.22E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.20E-03	--	3.20E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	8.60E+00	1.55E-02	7.58E-04	1.11E-01	0.00E+00	1.12E-01	1.82E-03	7.58E-02	1.89E-01	7.61E+00	<1	2.02E+01	<1
Copper	2.67E+01	1.83E-01	8.36E-02	1.45E+00	0.00E+00	1.54E+00	2.15E-02	2.35E-01	1.79E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.18E+01	3.52E-02	1.75E-02	1.02E+00	0.00E+00	1.04E+00	4.14E-03	1.92E-01	1.24E+00	1.63E+00	<1	4.46E+01	<1
Manganese	2.62E+03	3.75E+00	2.43E+00	1.01E+01	0.00E+00	1.25E+01	4.41E-01	2.31E+01	3.61E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.05E-05	--	3.05E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-03	0.00E+00	6.57E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-04	0.00E+00	2.35E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	3.30E-04	8.93E-06	1.09E-03	0.00E+00	1.10E-03	3.88E-05	1.67E-03	2.81E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.04E+01	2.48E-02	1.16E-03	9.06E-02	0.00E+00	9.18E-02	2.91E-03	1.80E-01	2.74E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	5.37E-01	7.90E-01	4.30E+01	0.00E+00	4.38E+01	6.31E-02	1.02E+00	4.49E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.20E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	3.70E-03	4.81E-02	4.00E-02	1.20E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.63E+00	--	2.63E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.09E-03	--	1.09E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04				
Total LMW PAHs						0.00E+00	1.55E-03	0.00E+00	1.55E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	3.52E-04	--	3.52E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.17E-03	--	1.17E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.58E-04	--	4.58E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.93E-04	--	8.93E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.15E-05	--	1.15E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.64E-04	--	3.64E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	8.22E-04	--	8.22E-04				
Total HMW PAHs						0.00E+00	4.13E-03	0.00E+00	4.13E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.60E-01	2.20E-02	1.84E-04	3.80E+00	0.00E+00	3.80E+00	2.58E-03	5.82E-03	3.81E+00	1.10E+00	3.46E+00	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H5-2
Screening-Level Exposure Evaluation - American Woodcock
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-3
Screening-Level Exposure Evaluation - Mourning Dove
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	8.79E-04	--	8.79E-04	No TRV	--	No TRV	--
Arsenic	1.53E+01	4.40E-03	6.55E-02	0.00E+00	0.00E+00	6.55E-02	5.02E-04	1.19E-01	1.85E-01	2.24E+00	<1	4.51E+00	<1
Barium	4.82E+02	2.71E+00	8.58E+00	0.00E+00	0.00E+00	8.58E+00	3.09E-01	3.74E+00	1.26E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04	No TRV	--	No TRV	--
Cadmium	3.90E-01	3.00E-03	4.24E-02	0.00E+00	0.00E+00	4.24E-02	3.42E-04	3.03E-03	4.58E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.10E-03	--	3.10E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	8.60E+00	1.55E-02	7.36E-03	0.00E+00	0.00E+00	7.36E-03	1.77E-03	6.67E-02	7.59E-02	7.61E+00	<1	2.02E+01	<1
Copper	2.67E+01	1.83E-01	8.12E-01	0.00E+00	0.00E+00	8.12E-01	2.09E-02	2.07E-01	1.04E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.18E+01	3.52E-02	1.70E-01	0.00E+00	0.00E+00	1.70E-01	4.02E-03	1.69E-01	3.44E-01	1.63E+00	<1	4.46E+01	<1
Manganese	2.62E+03	3.75E+00	2.36E+01	0.00E+00	0.00E+00	2.36E+01	4.28E-01	2.03E+01	4.44E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.38E-03	0.00E+00	6.38E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	0.00E+00	2.28E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	3.30E-04	8.67E-05	0.00E+00	0.00E+00	8.67E-05	3.77E-05	1.47E-03	1.60E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.04E+01	2.48E-02	1.13E-02	0.00E+00	0.00E+00	1.13E-02	2.83E-03	1.58E-01	1.72E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	5.37E-01	7.68E+00	0.00E+00	0.00E+00	7.68E+00	6.13E-02	9.00E-01	8.64E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.20E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	3.26E-03	4.64E-02	4.00E-02	1.16E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.56E+00	--	2.56E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.08E-05	--	7.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.06E-03	--	1.06E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04				
Total LMW PAHs						0.00E+00	1.50E-03	0.00E+00	1.50E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	3.42E-04	--	3.42E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.45E-04	--	4.45E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.67E-04	--	8.67E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.12E-05	--	1.12E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.54E-04	--	3.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	7.99E-04	--	7.99E-04				
Total HMW PAHs						0.00E+00	4.01E-03	0.00E+00	4.01E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.60E-01	2.20E-02	1.79E-03	0.00E+00	0.00E+00	1.79E-03	2.51E-03	5.12E-03	9.43E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H5-3
Screening-Level Exposure Evaluation - Mourning Dove
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	6.31E-04	--	6.31E-04	No TRV	--	No TRV	--
Arsenic	1.53E+01	4.40E-03	0.00E+00	0.00E+00	6.01E-03	6.01E-03	3.61E-04	3.26E-02	3.90E-02	2.24E+00	<1	4.51E+00	<1
Barium	4.82E+02	2.71E+00	0.00E+00	0.00E+00	2.70E-02	2.70E-02	2.22E-01	1.03E+00	1.28E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04	No TRV	--	No TRV	--
Cadmium	3.90E-01	3.00E-03	0.00E+00	0.00E+00	1.50E-02	1.50E-02	2.46E-04	8.32E-04	1.60E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	2.23E-03	--	2.23E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	8.60E+00	1.55E-02	0.00E+00	0.00E+00	1.57E-02	1.57E-02	1.27E-03	1.83E-02	3.53E-02	7.61E+00	<1	2.02E+01	<1
Copper	2.67E+01	1.83E-01	0.00E+00	0.00E+00	1.02E+00	1.02E+00	1.50E-02	5.69E-02	1.09E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.18E+01	3.52E-02	0.00E+00	0.00E+00	3.46E-01	3.46E-01	2.89E-03	4.65E-02	3.95E-01	1.63E+00	<1	4.46E+01	<1
Manganese	2.62E+03	3.75E+00	0.00E+00	0.00E+00	4.40E+00	4.40E+00	3.08E-01	5.59E+00	1.03E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.13E-05	--	2.13E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.58E-03	0.00E+00	4.58E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-04	0.00E+00	1.64E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	3.30E-04	0.00E+00	0.00E+00	1.69E-03	1.69E-03	2.71E-05	4.05E-04	2.12E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.04E+01	2.48E-02	0.00E+00	0.00E+00	2.06E-02	2.06E-02	2.03E-03	4.35E-02	6.61E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	5.37E-01	0.00E+00	0.00E+00	9.01E+00	9.01E+00	4.40E-02	2.47E-01	9.30E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.20E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	8.96E-04	3.19E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.84E+00	--	1.84E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	5.08E-05	--	5.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	7.63E-04	--	7.63E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04				
Total LMW PAHs						0.00E+00	1.08E-03	0.00E+00	1.08E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	2.46E-04	--	2.46E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	8.20E-04	--	8.20E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	3.20E-04	--	3.20E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	6.23E-04	--	6.23E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	8.04E-06	--	8.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	2.54E-04	--	2.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	5.74E-04	--	5.74E-04				
Total HMW PAHs						0.00E+00	2.88E-03	0.00E+00	2.88E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.60E-01	2.20E-02	0.00E+00	0.00E+00	4.22E-02	4.22E-02	1.80E-03	1.41E-03	4.54E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H5-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.22E-03	--	1.22E-03	No TRV	--	No TRV	--
Arsenic	1.53E+01	4.40E-03	0.00E+00	2.62E-01	0.00E+00	2.62E-01	6.97E-04	0.00E+00	2.63E-01	2.24E+00	<1	4.51E+00	<1
Barium	4.82E+02	2.71E+00	0.00E+00	6.94E+00	0.00E+00	6.94E+00	4.29E-01	0.00E+00	7.37E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04	No TRV	--	No TRV	--
Cadmium	3.90E-01	3.00E-03	0.00E+00	6.20E-01	0.00E+00	6.20E-01	4.75E-04	0.00E+00	6.21E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.31E-03	--	4.31E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	8.60E+00	1.55E-02	0.00E+00	1.66E-01	0.00E+00	1.66E-01	2.45E-03	0.00E+00	1.69E-01	7.61E+00	<1	2.02E+01	<1
Copper	2.67E+01	1.83E-01	0.00E+00	2.18E+00	0.00E+00	2.18E+00	2.90E-02	0.00E+00	2.21E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.18E+01	3.52E-02	0.00E+00	1.53E+00	0.00E+00	1.53E+00	5.57E-03	0.00E+00	1.54E+00	1.63E+00	<1	4.46E+01	<1
Manganese	2.62E+03	3.75E+00	0.00E+00	1.51E+01	0.00E+00	1.51E+01	5.94E-01	0.00E+00	1.57E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	4.12E-05	--	4.12E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-03	0.00E+00	8.85E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-04	0.00E+00	3.17E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	3.30E-04	0.00E+00	1.63E-03	0.00E+00	1.63E-03	5.22E-05	0.00E+00	1.68E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	2.04E+01	2.48E-02	0.00E+00	1.36E-01	0.00E+00	1.36E-01	3.93E-03	0.00E+00	1.40E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	5.37E-01	0.00E+00	6.44E+01	0.00E+00	6.44E+01	8.50E-02	0.00E+00	6.45E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.20E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.55E+00	--	3.55E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.82E-05	--	9.82E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.47E-03	--	1.47E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Total LMW PAHs						0.00E+00	2.08E-03	0.00E+00	2.08E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.75E-04	--	4.75E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.58E-03	--	1.58E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	6.17E-04	--	6.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.20E-03	--	1.20E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.55E-05	--	1.55E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.91E-04	--	4.91E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.11E-03	--	1.11E-03				
Total HMW PAHs						0.00E+00	5.57E-03	0.00E+00	5.57E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.60E-01	2.20E-02	0.00E+00	5.69E+00	0.00E+00	5.69E+00	3.48E-03	0.00E+00	5.69E+00	1.10E+00	5.17E+00	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H5-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-6
Screening-Level Exposure Evaluation - Canada Lynx
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	2.41E-04	--	2.41E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.53E+01	4.40E-03	0.00E+00	0.00E+00	2.29E-03	2.29E-03	1.37E-04	1.34E-02	1.58E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.82E+02	2.71E+00	0.00E+00	0.00E+00	1.03E-02	1.03E-02	8.47E-02	4.22E-01	5.17E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	3.90E-01	3.00E-03	0.00E+00	0.00E+00	5.70E-03	5.70E-03	9.37E-05	3.41E-04	6.13E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.50E-04	--	8.50E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	8.60E+00	1.55E-02	0.00E+00	0.00E+00	5.97E-03	5.97E-03	4.84E-04	7.52E-03	1.40E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.67E+01	1.83E-01	0.00E+00	0.00E+00	3.87E-01	3.87E-01	5.72E-03	2.34E-02	4.16E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.18E+01	3.52E-02	0.00E+00	0.00E+00	1.32E-01	1.32E-01	1.10E-03	1.91E-02	1.52E-01	4.70E+00	<1	1.86E+02	<1
Manganese	2.62E+03	3.75E+00	0.00E+00	0.00E+00	1.68E+00	1.68E+00	1.17E-01	2.29E+00	4.09E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	8.12E-06	--	8.12E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-03	0.00E+00	1.75E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.25E-05	0.00E+00	6.25E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.90E-01	3.30E-04	0.00E+00	0.00E+00	6.42E-04	6.42E-04	1.03E-05	1.66E-04	8.19E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	2.04E+01	2.48E-02	0.00E+00	0.00E+00	7.84E-03	7.84E-03	7.75E-04	1.78E-02	2.65E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.16E+02	5.37E-01	0.00E+00	0.00E+00	3.43E+00	3.43E+00	1.68E-02	1.01E-01	3.55E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.20E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	3.67E-04	1.22E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	7.00E-01	--	7.00E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.94E-05	--	1.94E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05				
Total LMW PAHs						0.00E+00	4.11E-04	0.00E+00	4.11E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	9.37E-05	--	9.37E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.12E-04	--	3.12E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.22E-04	--	1.22E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	3.06E-06	--	3.06E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.69E-05	--	9.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.19E-04	--	2.19E-04				
Total HMW PAHs						0.00E+00	1.10E-03	0.00E+00	1.10E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.60E-01	2.20E-02	0.00E+00	0.00E+00	1.61E-02	1.61E-02	6.87E-04	5.77E-04	1.73E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H5-6
Screening-Level Exposure Evaluation - Canada Lynx
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-7
Screening-Level Exposure Evaluation - Grizzly Bear
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	0.00E+00	1.66E-04	--	1.66E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.53E+01	4.40E-03	8.06E-03	5.37E-03	1.58E-04	0.00E+00	1.36E-02	9.50E-05	9.25E-03	1.37E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.82E+02	2.71E+00	1.06E+00	1.42E-01	7.10E-04	0.00E+00	1.20E+00	5.85E-02	2.91E-01	1.26E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	3.90E-01	3.00E-03	5.22E-03	1.27E-02	3.94E-04	0.00E+00	1.83E-02	6.48E-05	2.36E-04	1.84E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	0.00E+00	5.87E-04	--	5.87E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	8.60E+00	1.55E-02	9.05E-04	3.40E-03	4.13E-04	0.00E+00	4.72E-03	3.35E-04	5.20E-03	5.05E-03	7.33E+00	<1	1.89E+01	<1
Copper	2.67E+01	1.83E-01	9.99E-02	4.45E-02	2.67E-02	0.00E+00	1.71E-01	3.95E-03	1.61E-02	1.75E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.18E+01	3.52E-02	2.10E-02	3.13E-02	9.11E-03	0.00E+00	6.14E-02	7.60E-04	1.32E-02	6.22E-02	4.70E+00	<1	1.86E+02	<1
Manganese	2.62E+03	3.75E+00	2.91E+00	3.09E-01	1.16E-01	0.00E+00	3.33E+00	8.10E-02	1.58E+00	3.41E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	0.00E+00	5.61E-06	--	5.61E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-03	0.00E+00	1.21E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-05	0.00E+00	4.32E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.90E-01	3.30E-04	1.07E-05	3.33E-05	4.44E-05	0.00E+00	8.84E-05	7.13E-06	1.15E-04	9.55E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.04E+01	2.48E-02	1.39E-03	2.78E-03	5.42E-04	0.00E+00	4.71E-03	5.36E-04	1.23E-02	5.24E-03	4.16E+00	<1	9.44E+00	<1
Zinc	1.16E+02	5.37E-01	9.44E-01	1.32E+00	2.37E-01	0.00E+00	2.50E+00	1.16E-02	7.01E-02	2.51E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	4.20E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	2.54E-04	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	0.00E+00	4.84E-01	--	4.84E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	0.00E+00	1.34E-05	--	1.34E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05				
Total LMW PAHs							0.00E+00	2.84E-04	0.00E+00	2.84E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	0.00E+00	6.48E-05	--	6.48E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	0.00E+00	2.16E-04	--	2.16E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	0.00E+00	8.42E-05	--	8.42E-05				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	0.00E+00	1.64E-04	--	1.64E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	0.00E+00	2.12E-06	--	2.12E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	0.00E+00	6.69E-05	--	6.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	0.00E+00	1.51E-04	--	1.51E-04				
Total HMW PAHs							0.00E+00	7.59E-04	0.00E+00	7.59E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.60E-01	2.20E-02	2.20E-04	1.16E-01	1.11E-03	0.00E+00	1.18E-01	4.75E-04	3.99E-04	1.18E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H5-7
Screening-Level Exposure Evaluation - Grizzly Bear
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	3.96E-04	--	3.96E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.34E+01	4.40E-03	0.00E+00	0.00E+00	3.38E-03	3.38E-03	2.26E-04	1.10E-02	1.46E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.72E+02	2.71E+00	0.00E+00	0.00E+00	1.66E-02	1.66E-02	1.39E-01	3.89E-01	5.45E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	3.00E-03	0.00E+00	0.00E+00	7.06E-03	7.06E-03	1.54E-04	1.76E-04	7.39E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	1.40E-03	--	1.40E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	8.50E+00	1.55E-02	0.00E+00	0.00E+00	9.69E-03	9.69E-03	7.98E-04	7.00E-03	1.75E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.20E+01	1.83E-01	0.00E+00	0.00E+00	6.20E-01	6.20E-01	9.42E-03	1.81E-02	6.47E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.04E+01	3.52E-02	0.00E+00	0.00E+00	2.10E-01	2.10E-01	1.81E-03	1.68E-02	2.29E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.50E+02	3.75E+00	0.00E+00	0.00E+00	1.00E+00	1.00E+00	1.93E-01	7.82E-01	1.98E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-03	0.00E+00	2.88E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-04	0.00E+00	1.03E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	3.30E-04	0.00E+00	0.00E+00	6.26E-04	6.26E-04	1.70E-05	9.26E-05	7.36E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.88E+01	2.48E-02	0.00E+00	0.00E+00	1.19E-02	1.19E-02	1.28E-03	1.55E-02	2.87E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.15E+02	5.37E-01	0.00E+00	0.00E+00	5.65E+00	5.65E+00	2.76E-02	9.47E-02	5.77E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.80E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	2.31E-04	1.97E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.15E+00	--	1.15E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	3.19E-05	--	3.19E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	4.79E-04	--	4.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05				
Total LMW PAHs						0.00E+00	6.77E-04	0.00E+00	6.77E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	1.54E-04	--	1.54E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	5.15E-04	--	5.15E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	3.91E-04	--	3.91E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	5.04E-06	--	5.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	1.60E-04	--	1.60E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	3.60E-04	--	3.60E-04				
Total HMW PAHs						0.00E+00	1.81E-03	0.00E+00	1.81E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.33E-01	2.20E-02	0.00E+00	0.00E+00	2.13E-02	2.13E-02	1.13E-03	4.38E-04	2.29E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H5-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-9
Screening-Level Exposure Evaluation - Meadow Vole
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.16E-03	--	1.16E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.34E+01	4.40E-03	7.55E-02	0.00E+00	0.00E+00	7.55E-02	6.61E-04	2.62E-02	1.02E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.72E+02	2.71E+00	1.11E+01	0.00E+00	0.00E+00	1.11E+01	4.07E-01	9.22E-01	1.24E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	3.00E-03	4.02E-02	0.00E+00	0.00E+00	4.02E-02	4.51E-04	4.17E-04	4.11E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.09E-03	--	4.09E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	8.50E+00	1.55E-02	9.58E-03	0.00E+00	0.00E+00	9.58E-03	2.33E-03	1.66E-02	2.85E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.20E+01	1.83E-01	9.91E-01	0.00E+00	0.00E+00	9.91E-01	2.75E-02	4.30E-02	1.06E+00	5.60E+00	<1	8.27E+01	<1
Lead	2.04E+01	3.52E-02	2.16E-01	0.00E+00	0.00E+00	2.16E-01	5.29E-03	3.97E-02	2.61E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.50E+02	3.75E+00	1.13E+01	0.00E+00	0.00E+00	1.13E+01	5.63E-01	1.85E+00	1.37E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.91E-05	--	3.91E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-03	0.00E+00	8.40E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	0.00E+00	3.00E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	3.30E-04	6.76E-05	0.00E+00	0.00E+00	6.76E-05	4.96E-05	2.20E-04	3.37E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.88E+01	2.48E-02	1.37E-02	0.00E+00	0.00E+00	1.37E-02	3.73E-03	3.68E-02	5.42E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.15E+02	5.37E-01	1.01E+01	0.00E+00	0.00E+00	1.01E+01	8.07E-02	2.25E-01	1.04E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.80E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-02	5.47E-04	5.73E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.37E+00	--	3.37E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.40E-03	--	1.40E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04				
Total LMW PAHs						0.00E+00	1.98E-03	0.00E+00	1.98E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.51E-04	--	4.51E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.50E-03	--	1.50E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.86E-04	--	5.86E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.91E-05	--	6.91E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.47E-05	--	1.47E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.66E-04	--	4.66E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.05E-03	--	1.05E-03				
Total HMW PAHs						0.00E+00	5.28E-03	0.00E+00	5.28E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.33E-01	2.20E-02	1.90E-03	0.00E+00	0.00E+00	1.90E-03	3.31E-03	1.04E-03	6.25E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H5-9
Screening-Level Exposure Evaluation - Meadow Vole
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-10
Screening-Level Exposure Evaluation - North American Wolverine
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	2.31E-04	--	2.31E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.34E+01	4.40E-03	0.00E+00	0.00E+00	1.98E-03	1.98E-03	1.32E-04	1.13E-02	1.34E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.72E+02	2.71E+00	0.00E+00	0.00E+00	9.68E-03	9.68E-03	8.14E-02	3.97E-01	4.88E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	3.00E-03	0.00E+00	0.00E+00	4.12E-03	4.12E-03	9.01E-05	1.80E-04	4.39E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.17E-04	--	8.17E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	8.50E+00	1.55E-02	0.00E+00	0.00E+00	5.66E-03	5.66E-03	4.66E-04	7.15E-03	1.33E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.20E+01	1.83E-01	0.00E+00	0.00E+00	3.62E-01	3.62E-01	5.50E-03	1.85E-02	3.86E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.04E+01	3.52E-02	0.00E+00	0.00E+00	1.23E-01	1.23E-01	1.06E-03	1.71E-02	1.41E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.50E+02	3.75E+00	0.00E+00	0.00E+00	5.85E-01	5.85E-01	1.13E-01	7.99E-01	1.50E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	7.81E-06	--	7.81E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-03	0.00E+00	1.68E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.01E-05	0.00E+00	6.01E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	3.30E-04	0.00E+00	0.00E+00	3.66E-04	3.66E-04	9.92E-06	9.46E-05	4.70E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.88E+01	2.48E-02	0.00E+00	0.00E+00	6.96E-03	6.96E-03	7.45E-04	1.58E-02	2.35E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.15E+02	5.37E-01	0.00E+00	0.00E+00	3.30E+00	3.30E+00	1.61E-02	9.67E-02	3.41E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.80E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	2.36E-04	1.16E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	6.73E-01	--	6.73E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.86E-05	--	1.86E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05				
Total LMW PAHs						0.00E+00	3.95E-04	0.00E+00	3.95E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	9.01E-05	--	9.01E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.00E-04	--	3.00E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	2.94E-06	--	2.94E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.10E-04	--	2.10E-04				
Total HMW PAHs						0.00E+00	1.06E-03	0.00E+00	1.06E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.33E-01	2.20E-02	0.00E+00	0.00E+00	1.25E-02	1.25E-02	6.61E-04	4.48E-04	1.36E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H5-10
Screening-Level Exposure Evaluation - North American Wolverine
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H5-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.03E-03	--	1.03E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.34E+01	4.40E-03	0.00E+00	2.02E-01	0.00E+00	2.02E-01	5.90E-04	1.98E-02	2.23E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.72E+02	2.71E+00	0.00E+00	5.76E+00	0.00E+00	5.76E+00	3.63E-01	6.96E-01	6.82E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	3.00E-03	0.00E+00	3.25E-01	0.00E+00	3.25E-01	4.02E-04	3.15E-04	3.26E-01	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.65E-03	--	3.65E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	8.50E+00	1.55E-02	0.00E+00	1.39E-01	0.00E+00	1.39E-01	2.08E-03	1.25E-02	1.54E-01	7.33E+00	<1	1.89E+01	<1
Copper	2.20E+01	1.83E-01	0.00E+00	1.52E+00	0.00E+00	1.52E+00	2.45E-02	3.25E-02	1.58E+00	5.60E+00	<1	8.27E+01	<1
Lead	2.04E+01	3.52E-02	0.00E+00	1.23E+00	0.00E+00	1.23E+00	4.72E-03	3.00E-02	1.26E+00	4.70E+00	<1	1.86E+02	<1
Manganese	9.50E+02	3.75E+00	0.00E+00	6.41E+00	0.00E+00	6.41E+00	5.03E-01	1.40E+00	8.31E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.48E-05	--	3.48E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.49E-03	0.00E+00	7.49E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E-04	0.00E+00	2.68E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	3.30E-04	0.00E+00	8.16E-04	0.00E+00	8.16E-04	4.42E-05	1.66E-04	1.03E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.88E+01	2.48E-02	0.00E+00	1.06E-01	0.00E+00	1.06E-01	3.32E-03	2.78E-02	1.37E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.15E+02	5.37E-01	0.00E+00	5.44E+01	0.00E+00	5.44E+01	7.20E-02	1.70E-01	5.46E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.80E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	4.13E-04	5.11E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.00E+00	--	3.00E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.25E-03	--	1.25E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Total LMW PAHs						0.00E+00	1.76E-03	0.00E+00	1.76E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.02E-04	--	4.02E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.34E-03	--	1.34E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.23E-04	--	5.23E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.02E-03	--	1.02E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.31E-05	--	1.31E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.15E-04	--	4.15E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	9.38E-04	--	9.38E-04				
Total HMW PAHs						0.00E+00	4.71E-03	0.00E+00	4.71E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.33E-01	2.20E-02	0.00E+00	3.88E+00	0.00E+00	3.88E+00	2.95E-03	7.85E-04	3.89E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H5-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.58E+01	3.75E-02	5.93E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.69E+00	Sample et al. (1999)	Regression ^f	7.52E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	5.33E+02	1.56E-01	8.31E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	4.85E+01	Sample et al. (1998a)	6.83E-04	3.64E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	3.32E+01	Regression ^a	7.75E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.71E+01	Sample et al. (1998a)	Regression ^f	1.28E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	4.48E+01	Regression ^a	2.24E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.73E+01	Sample et al. (1999)	Regression ^f	5.80E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	2.21E+03	7.90E-02	1.75E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.50E+01	Sample et al. (1999)	2.05E-02	4.53E+01	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	1.10E+00	Regression ^a	5.65E-01	Bechtel-Jacobs (1998a)	Regression ^d	9.95E-01	Sample et al. (1998a)	Regression ^f	6.84E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	2.14E+01	4.85E-03	1.04E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	8.99E-01	Sample et al. (1998a)	1.23E-02	2.63E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	2.38E+02	Regression ^a	1.00E+02	Bechtel-Jacobs (1998a)	Regression ^d	5.15E+02	Sample et al. (1998a)	Regression ^f	1.16E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	2.20E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H6-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	3.50E-01	2.38E-02	8.33E-03	USEPA (2007a)	5.44E+01	1.90E+01	USEPA (2007a)	7.79E-01	2.73E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	1.84E-06	9.41E-02	1.73E-07	USEPA (2007a) ^b	Regression ^d	5.69E-06	Sample et al. (1998a)	Regression ^h	1.12E-06	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	3.10E-07	5.17E-02	1.60E-08	USEPA (2007a) ^b	Regression ^d	6.94E-07	Sample et al. (1998a)	Regression ^h	1.58E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	1.07E-06	2.82E-02	3.02E-08	USEPA (2007a) ^b	Regression ^d	3.00E-06	Sample et al. (1998a)	Regression ^h	6.15E-07	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	1.11E-06	2.82E-02	3.13E-08	USEPA (2007a) ^b	Regression ^d	3.13E-06	Sample et al. (1998a)	Regression ^h	6.40E-07	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	1.29E-06	2.82E-02	3.64E-08	USEPA (2007a) ^b	Regression ^d	3.74E-06	Sample et al. (1998a)	Regression ^h	7.55E-07	Sample et al. (1998b)

Table H6-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	6.36E-06	1.55E-02	9.86E-08	USEPA (2007a) ^b	Regression ^d	2.47E-05	Sample et al. (1998a)	Regression ^h	4.36E-06	Sample et al. (1998b)
OCDD	9.50	0.00E+00	3.35E-05	8.45E-03	2.83E-07	USEPA (2007a) ^b	Regression ^d	1.76E-04	Sample et al. (1998a)	Regression ^h	2.71E-05	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	2.80E-07	9.24E-02	2.59E-08	USEPA (2007a) ^b	Regression ^d	6.15E-07	Sample et al. (1998a)	1.25E-01	3.50E-08	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	8.00E-07	3.70E-02	2.96E-08	USEPA (2007a) ^b	Regression ^d	2.13E-06	Sample et al. (1998a)	1.25E-01	1.00E-07	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.60E-07	3.70E-02	2.81E-08	USEPA (2007a) ^b	Regression ^d	2.00E-06	Sample et al. (1998a)	1.25E-01	9.51E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	9.20E-07	5.08E-02	4.67E-08	USEPA (2007a) ^b	Regression ^d	2.51E-06	Sample et al. (1998a)	1.25E-01	1.15E-07	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	2.03E-06	2.77E-02	5.62E-08	USEPA (2007a) ^b	Regression ^d	6.39E-06	Sample et al. (1998a)	1.25E-01	2.54E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	7.38E-06	1.52E-02	1.12E-07	USEPA (2007a) ^b	Regression ^d	2.94E-05	Sample et al. (1998a)	1.25E-01	9.23E-07	Sample et al. (1998b) ⁱ

Table H6-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H6-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	1.42E+01	3.75E-02	5.34E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.57E+00	Sample et al. (1999)	Regression ^f	6.90E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	4.93E+02	1.56E-01	7.68E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	4.48E+01	Sample et al. (1998a)	6.83E-04	3.36E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	2.90E+01	Regression ^a	7.35E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.49E+01	Sample et al. (1998a)	Regression ^f	1.25E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	1.98E+01	Regression ^a	1.41E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.93E+00	Sample et al. (1999)	Regression ^f	4.04E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	7.45E+02	7.90E-02	5.88E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	4.05E+01	Sample et al. (1999)	2.05E-02	1.53E+01	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	1.05E+00	Regression ^a	5.36E-01	Bechtel-Jacobs (1998a)	Regression ^d	9.62E-01	Sample et al. (1998a)	Regression ^f	6.72E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	2.00E+01	4.85E-03	9.68E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	8.38E-01	Sample et al. (1998a)	1.23E-02	2.45E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	1.65E+02	Regression ^a	8.16E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.56E+02	Sample et al. (1998a)	Regression ^f	1.13E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	5.82E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H6-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	2.45E-01	2.38E-02	5.83E-03	USEPA (2007a)	5.44E+01	1.33E+01	USEPA (2007a)	7.79E-01	1.91E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	1.39E-06	9.41E-02	1.31E-07	USEPA (2007a) ^b	Regression ^d	4.09E-06	Sample et al. (1998a)	Regression ^h	8.20E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	1.60E-07	5.17E-02	8.28E-09	USEPA (2007a) ^b	Regression ^d	3.17E-07	Sample et al. (1998a)	Regression ^h	7.61E-08	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	1.07E-06	2.82E-02	3.02E-08	USEPA (2007a) ^b	Regression ^d	3.00E-06	Sample et al. (1998a)	Regression ^h	6.15E-07	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	2.90E-07	2.82E-02	8.18E-09	USEPA (2007a) ^b	Regression ^d	6.41E-07	Sample et al. (1998a)	Regression ^h	1.46E-07	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	6.00E-07	2.82E-02	1.69E-08	USEPA (2007a) ^b	Regression ^d	1.51E-06	Sample et al. (1998a)	Regression ^h	3.26E-07	Sample et al. (1998b)

Table H6-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	2.59E-06	1.55E-02	4.02E-08	USEPA (2007a) ^b	Regression ^d	8.53E-06	Sample et al. (1998a)	Regression ^h	1.63E-06	Sample et al. (1998b)
OCDD	9.50	0.00E+00	1.79E-05	8.45E-03	1.51E-07	USEPA (2007a) ^b	Regression ^d	8.38E-05	Sample et al. (1998a)	Regression ^h	1.36E-05	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	1.53E-07	9.24E-02	1.41E-08	USEPA (2007a) ^b	Regression ^d	3.01E-07	Sample et al. (1998a)	1.25E-01	1.91E-08	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	2.35E-07	3.70E-02	8.69E-09	USEPA (2007a) ^b	Regression ^d	5.00E-07	Sample et al. (1998a)	1.25E-01	2.94E-08	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	3.63E-07	3.70E-02	1.34E-08	USEPA (2007a) ^b	Regression ^d	8.36E-07	Sample et al. (1998a)	1.25E-01	4.54E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	2.64E-07	5.08E-02	1.34E-08	USEPA (2007a) ^b	Regression ^d	5.74E-07	Sample et al. (1998a)	1.25E-01	3.30E-08	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	7.25E-07	2.77E-02	2.01E-08	USEPA (2007a) ^b	Regression ^d	1.89E-06	Sample et al. (1998a)	1.25E-01	9.07E-08	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	2.22E-06	1.52E-02	3.38E-08	USEPA (2007a) ^b	Regression ^d	7.11E-06	Sample et al. (1998a)	1.25E-01	2.78E-07	Sample et al. (1998b) ⁱ

Table H6-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H6-2
Screening-Level Exposure Evaluation - American Woodcock
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-04	0.00E+00	9.05E-04	No TRV	--	No TRV	--
Arsenic	1.58E+01	4.40E-03	6.96E-03	1.79E-01	0.00E+00	1.86E-01	5.17E-04	1.39E-01	3.26E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.33E+02	2.71E+00	9.77E-01	5.13E+00	0.00E+00	6.11E+00	3.18E-01	4.70E+00	1.11E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-04	0.00E+00	1.76E-04	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-04	0.00E+00	3.52E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.20E-03	--	3.20E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-03	0.00E+00	1.82E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.32E+01	1.83E-01	9.11E-02	1.81E+00	0.00E+00	1.90E+00	2.15E-02	2.93E-01	2.21E+00	4.05E+00	<1	3.48E+01	<1
Lead	4.48E+01	3.52E-02	2.63E-02	1.83E+00	0.00E+00	1.85E+00	4.14E-03	3.95E-01	2.25E+00	1.63E+00	1.38E+00	4.46E+01	<1
Manganese	2.21E+03	3.75E+00	2.05E+00	8.99E+00	0.00E+00	1.10E+01	4.41E-01	1.95E+01	3.10E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.05E-05	--	3.05E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-03	0.00E+00	6.57E-03	6.71E+00	<1	1.86E+01	<1
Selenium	1.10E+00	2.00E-03	6.63E-03	1.05E-01	0.00E+00	1.12E-01	2.35E-04	9.69E-03	1.22E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E-05	0.00E+00	3.88E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	2.14E+01	2.48E-02	1.22E-03	9.50E-02	0.00E+00	9.63E-02	2.91E-03	1.89E-01	2.88E-01	3.44E-01	<1	1.70E+00	<1
Zinc	2.38E+02	5.37E-01	1.18E+00	5.44E+01	0.00E+00	5.56E+01	6.31E-02	2.10E+00	5.78E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.20E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	1.94E-02	6.38E-02	4.00E-02	1.59E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.63E+00	--	2.63E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.09E-03	--	1.09E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04				
Total LMW PAHs						0.00E+00	1.55E-03	0.00E+00	1.55E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	3.52E-04	--	3.52E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.17E-03	--	1.17E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.58E-04	--	4.58E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.93E-04	--	8.93E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.15E-05	--	1.15E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.64E-04	--	3.64E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	8.22E-04	--	8.22E-04				
Total HMW PAHs						0.00E+00	4.13E-03	0.00E+00	4.13E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	3.50E-01	2.20E-02	9.78E-05	2.01E+00	0.00E+00	2.01E+00	2.58E-03	3.08E-03	2.02E+00	1.10E+00	1.84E+00	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H6-2
Screening-Level Exposure Evaluation - American Woodcock
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	2.03E-09	6.02E-07	0.00E+00	6.04E-07	0.00E+00	1.62E-08	6.20E-07				
1,2,3,7,8-PeCDD	3.10E-07	0.00E+00	1.88E-10	7.33E-08	0.00E+00	7.35E-08	0.00E+00	2.73E-09	7.63E-08				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	3.54E-10	3.17E-07	0.00E+00	1.59E-08	0.00E+00	4.71E-10	1.63E-08				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	3.68E-10	3.31E-07	0.00E+00	3.32E-09	0.00E+00	9.78E-11	3.41E-09				
1,2,3,7,8,9-HxCDD	1.29E-06	0.00E+00	4.27E-10	3.96E-07	0.00E+00	3.96E-08	0.00E+00	1.14E-09	4.07E-08				
1,2,3,4,6,7,8-HpCDD	6.36E-06	0.00E+00	1.16E-09	2.61E-06	0.00E+00	2.61E-09	0.00E+00	5.60E-11	2.66E-09				
OCDD	3.35E-05	0.00E+00	3.33E-09	1.86E-05	0.00E+00	1.86E-09	0.00E+00	2.95E-11	1.89E-09				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	3.04E-10	6.50E-08	0.00E+00	6.53E-08	0.00E+00	2.47E-09	6.78E-08				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	3.47E-10	2.25E-07	0.00E+00	2.25E-08	0.00E+00	7.05E-10	2.32E-08				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	3.30E-10	2.12E-07	0.00E+00	2.12E-08	0.00E+00	6.70E-10	2.19E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	5.49E-10	2.65E-07	0.00E+00	2.66E-08	0.00E+00	8.11E-10	2.74E-08				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	6.60E-10	6.76E-07	0.00E+00	6.77E-09	0.00E+00	1.79E-10	6.95E-09				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	7.38E-06	0.00E+00	1.32E-09	3.11E-06	0.00E+00	3.11E-10	0.00E+00	6.50E-12	3.18E-10				
Total Dioxins/Furans						8.84E-07	0.00E+00	2.56E-08	9.09E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-3
Screening-Level Exposure Evaluation - Mourning Dove
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.79E-04	0.00E+00	8.79E-04	No TRV	--	No TRV	--
Arsenic	1.58E+01	4.40E-03	6.77E-02	0.00E+00	0.00E+00	6.77E-02	5.02E-04	1.23E-01	1.91E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.33E+02	2.71E+00	9.49E+00	0.00E+00	0.00E+00	9.49E+00	3.09E-01	4.14E+00	1.39E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-04	0.00E+00	1.71E-04	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.42E-04	0.00E+00	3.42E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.10E-03	--	3.10E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	0.00E+00	1.77E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.32E+01	1.83E-01	8.85E-01	0.00E+00	0.00E+00	8.85E-01	2.09E-02	2.58E-01	1.16E+00	4.05E+00	<1	3.48E+01	<1
Lead	4.48E+01	3.52E-02	2.55E-01	0.00E+00	0.00E+00	2.55E-01	4.02E-03	3.48E-01	6.07E-01	1.63E+00	<1	4.46E+01	<1
Manganese	2.21E+03	3.75E+00	1.99E+01	0.00E+00	0.00E+00	1.99E+01	4.28E-01	1.72E+01	3.75E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.38E-03	0.00E+00	6.38E-03	6.71E+00	<1	1.86E+01	<1
Selenium	1.10E+00	2.00E-03	6.44E-02	0.00E+00	0.00E+00	6.44E-02	2.28E-04	8.54E-03	7.32E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-05	0.00E+00	3.77E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	2.14E+01	2.48E-02	1.18E-02	0.00E+00	0.00E+00	1.18E-02	2.83E-03	1.66E-01	1.81E-01	3.44E-01	<1	1.70E+00	<1
Zinc	2.38E+02	5.37E-01	1.14E+01	0.00E+00	0.00E+00	1.14E+01	6.13E-02	1.85E+00	1.33E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.20E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	1.71E-02	6.02E-02	4.00E-02	1.51E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.56E+00	--	2.56E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.08E-05	--	7.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.06E-03	--	1.06E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04				
Total LMW PAHs						0.00E+00	1.50E-03	0.00E+00	1.50E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	3.42E-04	--	3.42E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.45E-04	--	4.45E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.67E-04	--	8.67E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.12E-05	--	1.12E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.54E-04	--	3.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	7.99E-04	--	7.99E-04				
Total HMW PAHs						0.00E+00	4.01E-03	0.00E+00	4.01E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	3.50E-01	2.20E-02	9.50E-04	0.00E+00	0.00E+00	9.50E-04	2.51E-03	2.72E-03	6.18E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H6-3
Screening-Level Exposure Evaluation - Mourning Dove
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	1.98E-08	0.00E+00	0.00E+00	1.98E-08	0.00E+00	1.43E-08	3.40E-08				
1,2,3,7,8-PeCDD	3.10E-07	0.00E+00	1.83E-09	0.00E+00	0.00E+00	1.83E-09	0.00E+00	2.41E-09	4.24E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	3.44E-09	0.00E+00	0.00E+00	1.72E-10	0.00E+00	4.15E-10	5.87E-10				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	3.57E-09	0.00E+00	0.00E+00	3.57E-11	0.00E+00	8.62E-11	1.22E-10				
1,2,3,7,8,9-HxCDD	1.29E-06	0.00E+00	4.15E-09	0.00E+00	0.00E+00	4.15E-10	0.00E+00	1.00E-09	1.42E-09				
1,2,3,4,6,7,8-HpCDD	6.36E-06	0.00E+00	1.13E-08	0.00E+00	0.00E+00	1.13E-11	0.00E+00	4.94E-11	6.06E-11				
OCDD	3.35E-05	0.00E+00	3.23E-08	0.00E+00	0.00E+00	3.23E-12	0.00E+00	2.60E-11	2.92E-11				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	2.95E-09	0.00E+00	0.00E+00	2.95E-09	0.00E+00	2.17E-09	5.12E-09				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	3.38E-09	0.00E+00	0.00E+00	3.38E-10	0.00E+00	6.21E-10	9.58E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	3.21E-09	0.00E+00	0.00E+00	3.21E-10	0.00E+00	5.90E-10	9.11E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	5.33E-09	0.00E+00	0.00E+00	5.33E-10	0.00E+00	7.14E-10	1.25E-09				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	6.41E-09	0.00E+00	0.00E+00	6.41E-11	0.00E+00	1.58E-10	2.22E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	7.38E-06	0.00E+00	1.28E-08	0.00E+00	0.00E+00	1.28E-12	0.00E+00	5.73E-12	7.01E-12				
Total Dioxins/Furans						2.64E-08	0.00E+00	2.25E-08	4.90E-08	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.31E-04	0.00E+00	6.31E-04	No TRV	--	No TRV	--
Arsenic	1.58E+01	4.40E-03	0.00E+00	0.00E+00	6.17E-03	6.17E-03	3.61E-04	3.37E-02	4.02E-02	2.24E+00	<1	4.51E+00	<1
Barium	5.33E+02	2.71E+00	0.00E+00	0.00E+00	2.98E-02	2.98E-02	2.22E-01	1.14E+00	1.39E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-04	0.00E+00	1.23E-04	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	0.00E+00	2.46E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	2.23E-03	--	2.23E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	0.00E+00	1.27E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.32E+01	1.83E-01	0.00E+00	0.00E+00	1.05E+00	1.05E+00	1.50E-02	7.08E-02	1.13E+00	4.05E+00	<1	3.48E+01	<1
Lead	4.48E+01	3.52E-02	0.00E+00	0.00E+00	4.75E-01	4.75E-01	2.89E-03	9.55E-02	5.74E-01	1.63E+00	<1	4.46E+01	<1
Manganese	2.21E+03	3.75E+00	0.00E+00	0.00E+00	3.72E+00	3.72E+00	3.08E-01	4.71E+00	8.74E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.13E-05	--	2.13E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.58E-03	0.00E+00	4.58E-03	6.71E+00	<1	1.86E+01	<1
Selenium	1.10E+00	2.00E-03	0.00E+00	0.00E+00	5.61E-02	5.61E-02	1.64E-04	2.35E-03	5.86E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-05	0.00E+00	2.71E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	2.14E+01	2.48E-02	0.00E+00	0.00E+00	2.16E-02	2.16E-02	2.03E-03	4.56E-02	6.93E-02	3.44E-01	<1	1.70E+00	<1
Zinc	2.38E+02	5.37E-01	0.00E+00	0.00E+00	9.47E+00	9.47E+00	4.40E-02	5.07E-01	1.00E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.20E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	4.69E-03	3.57E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.84E+00	--	1.84E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	5.08E-05	--	5.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	7.63E-04	--	7.63E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04				
Total LMW PAHs						0.00E+00	1.08E-03	0.00E+00	1.08E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	2.46E-04	--	2.46E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	8.20E-04	--	8.20E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	3.20E-04	--	3.20E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	6.23E-04	--	6.23E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	8.04E-06	--	8.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	2.54E-04	--	2.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	5.74E-04	--	5.74E-04				
Total HMW PAHs						0.00E+00	2.88E-03	0.00E+00	2.88E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	3.50E-01	2.20E-02	0.00E+00	0.00E+00	2.24E-02	2.24E-02	1.80E-03	7.46E-04	2.49E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H6-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	0.00E+00	0.00E+00	9.15E-08	9.15E-08	0.00E+00	3.92E-09	9.54E-08				
1,2,3,7,8-PeCDD	3.10E-07	0.00E+00	0.00E+00	0.00E+00	1.29E-08	1.29E-08	0.00E+00	6.61E-10	1.36E-08				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	0.00E+00	5.04E-08	2.52E-09	0.00E+00	1.14E-10	2.64E-09				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	0.00E+00	0.00E+00	5.25E-08	5.25E-10	0.00E+00	2.37E-11	5.49E-10				
1,2,3,7,8,9-HxCDD	1.29E-06	0.00E+00	0.00E+00	0.00E+00	6.19E-08	6.19E-09	0.00E+00	2.75E-10	6.47E-09				
1,2,3,4,6,7,8-HpCDD	6.36E-06	0.00E+00	0.00E+00	0.00E+00	3.58E-07	3.58E-10	0.00E+00	1.36E-11	3.71E-10				
OCDD	3.35E-05	0.00E+00	0.00E+00	0.00E+00	2.22E-06	2.22E-10	0.00E+00	7.14E-12	2.29E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	0.00E+00	0.00E+00	2.87E-09	2.87E-09	0.00E+00	5.97E-10	3.47E-09				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	0.00E+00	0.00E+00	8.21E-09	8.21E-10	0.00E+00	1.71E-10	9.91E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	0.00E+00	0.00E+00	7.80E-09	7.80E-10	0.00E+00	1.62E-10	9.42E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	0.00E+00	0.00E+00	9.44E-09	9.44E-10	0.00E+00	1.96E-10	1.14E-09				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	0.00E+00	0.00E+00	2.08E-08	2.08E-10	0.00E+00	4.33E-11	2.52E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	7.38E-06	0.00E+00	0.00E+00	0.00E+00	7.57E-08	7.57E-12	0.00E+00	1.57E-12	9.15E-12				
Total Dioxins/Furans						1.20E-07	0.00E+00	6.19E-09	1.26E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-03	0.00E+00	1.22E-03	No TRV	--	No TRV	--
Arsenic	1.58E+01	4.40E-03	0.00E+00	2.68E-01	0.00E+00	2.68E-01	6.97E-04	0.00E+00	2.69E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.33E+02	2.71E+00	0.00E+00	7.68E+00	0.00E+00	7.68E+00	4.29E-01	0.00E+00	8.11E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	0.00E+00	2.37E-04	No TRV	--	No TRV	--
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-04	0.00E+00	4.75E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.31E-03	--	4.31E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-03	0.00E+00	2.45E-03	7.61E+00	<1	2.02E+01	<1
Copper	3.32E+01	1.83E-01	0.00E+00	2.71E+00	0.00E+00	2.71E+00	2.90E-02	0.00E+00	2.74E+00	4.05E+00	<1	3.48E+01	<1
Lead	4.48E+01	3.52E-02	0.00E+00	2.74E+00	0.00E+00	2.74E+00	5.57E-03	0.00E+00	2.74E+00	1.63E+00	1.68E+00	4.46E+01	<1
Manganese	2.21E+03	3.75E+00	0.00E+00	1.35E+01	0.00E+00	1.35E+01	5.94E-01	0.00E+00	1.41E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	4.12E-05	--	4.12E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-03	0.00E+00	8.85E-03	6.71E+00	<1	1.86E+01	<1
Selenium	1.10E+00	2.00E-03	0.00E+00	1.58E-01	0.00E+00	1.58E-01	3.17E-04	0.00E+00	1.58E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-05	0.00E+00	5.22E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	2.14E+01	2.48E-02	0.00E+00	1.42E-01	0.00E+00	1.42E-01	3.93E-03	0.00E+00	1.46E-01	3.44E-01	<1	1.70E+00	<1
Zinc	2.38E+02	5.37E-01	0.00E+00	8.15E+01	0.00E+00	8.15E+01	8.50E-02	0.00E+00	8.16E+01	6.61E+01	1.23E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.20E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.55E+00	--	3.55E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.82E-05	--	9.82E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.47E-03	--	1.47E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Total LMW PAHs						0.00E+00	2.08E-03	0.00E+00	2.08E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.75E-04	--	4.75E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.58E-03	--	1.58E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	6.17E-04	--	6.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.20E-03	--	1.20E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.55E-05	--	1.55E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.91E-04	--	4.91E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.11E-03	--	1.11E-03				
Total HMW PAHs						0.00E+00	5.57E-03	0.00E+00	5.57E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	3.50E-01	2.20E-02	0.00E+00	3.02E+00	0.00E+00	3.02E+00	3.48E-03	0.00E+00	3.02E+00	1.10E+00	2.74E+00	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H6-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	1.84E-06	0.00E+00	0.00E+00	9.01E-07	0.00E+00	9.01E-07	0.00E+00	0.00E+00	9.01E-07					
1,2,3,7,8-PeCDD	3.10E-07	0.00E+00	0.00E+00	1.10E-07	0.00E+00	1.10E-07	0.00E+00	0.00E+00	1.10E-07					
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	4.75E-07	0.00E+00	2.37E-08	0.00E+00	0.00E+00	2.37E-08					
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	0.00E+00	4.96E-07	0.00E+00	4.96E-09	0.00E+00	0.00E+00	4.96E-09					
1,2,3,7,8,9-HxCDD	1.29E-06	0.00E+00	0.00E+00	5.92E-07	0.00E+00	5.92E-08	0.00E+00	0.00E+00	5.92E-08					
1,2,3,4,6,7,8-HpCDD	6.36E-06	0.00E+00	0.00E+00	3.90E-06	0.00E+00	3.90E-09	0.00E+00	0.00E+00	3.90E-09					
OCDD	3.35E-05	0.00E+00	0.00E+00	2.78E-05	0.00E+00	2.78E-09	0.00E+00	0.00E+00	2.78E-09					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	0.00E+00	9.74E-08	0.00E+00	9.74E-08	0.00E+00	0.00E+00	9.74E-08					
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	0.00E+00	3.37E-07	0.00E+00	3.37E-08	0.00E+00	0.00E+00	3.37E-08					
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	0.00E+00	3.17E-07	0.00E+00	3.17E-08	0.00E+00	0.00E+00	3.17E-08					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	0.00E+00	3.97E-07	0.00E+00	3.97E-08	0.00E+00	0.00E+00	3.97E-08					
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	0.00E+00	1.01E-06	0.00E+00	1.01E-08	0.00E+00	0.00E+00	1.01E-08					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	7.38E-06	0.00E+00	0.00E+00	4.66E-06	0.00E+00	4.66E-10	0.00E+00	0.00E+00	4.66E-10					
Total Dioxins/Furans						1.32E-06	0.00E+00	0.00E+00	1.32E-06	1.75E-06	<1	1.75E-05	<1	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-6
Screening-Level Exposure Evaluation - Canada Lynx
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-04	0.00E+00	2.41E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.58E+01	4.40E-03	0.00E+00	0.00E+00	2.35E-03	2.35E-03	1.37E-04	1.38E-02	1.63E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.33E+02	2.71E+00	0.00E+00	0.00E+00	1.14E-02	1.14E-02	8.47E-02	4.66E-01	5.62E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.69E-05	0.00E+00	4.69E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	0.00E+00	9.37E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.50E-04	--	8.50E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-04	0.00E+00	4.84E-04	7.33E+00	<1	1.89E+01	<1
Copper	3.32E+01	1.83E-01	0.00E+00	0.00E+00	3.99E-01	3.99E-01	5.72E-03	2.90E-02	4.34E-01	5.60E+00	<1	8.27E+01	<1
Lead	4.48E+01	3.52E-02	0.00E+00	0.00E+00	1.81E-01	1.81E-01	1.10E-03	3.92E-02	2.21E-01	4.70E+00	<1	1.86E+02	<1
Manganese	2.21E+03	3.75E+00	0.00E+00	0.00E+00	1.42E+00	1.42E+00	1.17E-01	1.93E+00	3.47E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	8.12E-06	--	8.12E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-03	0.00E+00	1.75E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.10E+00	2.00E-03	0.00E+00	0.00E+00	2.14E-02	2.14E-02	6.25E-05	9.62E-04	2.24E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-05	0.00E+00	1.03E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.14E+01	2.48E-02	0.00E+00	0.00E+00	8.22E-03	8.22E-03	7.75E-04	1.87E-02	2.77E-02	4.16E+00	<1	9.44E+00	<1
Zinc	2.38E+02	5.37E-01	0.00E+00	0.00E+00	3.61E+00	3.61E+00	1.68E-02	2.08E-01	3.83E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.20E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	1.92E-03	1.37E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	7.00E-01	--	7.00E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.94E-05	--	1.94E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05				
Total LMW PAHs						0.00E+00	4.11E-04	0.00E+00	4.11E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	9.37E-05	--	9.37E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.12E-04	--	3.12E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.22E-04	--	1.22E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	3.06E-06	--	3.06E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.69E-05	--	9.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.19E-04	--	2.19E-04				
Total HMW PAHs						0.00E+00	1.10E-03	0.00E+00	1.10E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	3.50E-01	2.20E-02	0.00E+00	0.00E+00	8.52E-03	8.52E-03	6.87E-04	3.06E-04	9.51E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H6-6
Screening-Level Exposure Evaluation - Canada Lynx
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	1.84E-06	0.00E+00	0.00E+00	0.00E+00	3.49E-08	3.49E-08	0.00E+00	1.61E-09	3.65E-08					
1,2,3,7,8-PeCDD	3.10E-07	0.00E+00	0.00E+00	0.00E+00	4.92E-09	4.92E-09	0.00E+00	2.71E-10	5.19E-09					
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	0.00E+00	1.92E-08	1.92E-09	0.00E+00	9.36E-11	2.02E-09					
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	0.00E+00	0.00E+00	2.00E-08	2.00E-09	0.00E+00	9.71E-11	2.10E-09					
1,2,3,7,8,9-HxCDD	1.29E-06	0.00E+00	0.00E+00	0.00E+00	2.36E-08	2.36E-09	0.00E+00	1.13E-10	2.47E-09					
1,2,3,4,6,7,8-HpCDD	6.36E-06	0.00E+00	0.00E+00	0.00E+00	1.36E-07	1.36E-09	0.00E+00	5.56E-11	1.42E-09					
OCDD	3.35E-05	0.00E+00	0.00E+00	0.00E+00	8.47E-07	2.54E-10	0.00E+00	8.79E-12	2.63E-10					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	0.00E+00	0.00E+00	1.09E-09	3.28E-10	0.00E+00	7.35E-11	4.02E-10					
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	0.00E+00	0.00E+00	3.13E-09	3.13E-10	0.00E+00	7.00E-11	3.83E-10					
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	0.00E+00	0.00E+00	2.97E-09	2.97E-10	0.00E+00	6.65E-11	3.64E-10					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	0.00E+00	0.00E+00	3.60E-09	3.60E-10	0.00E+00	8.05E-11	4.40E-10					
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	0.00E+00	0.00E+00	7.93E-09	7.93E-11	0.00E+00	1.78E-11	9.71E-11					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	7.38E-06	0.00E+00	0.00E+00	0.00E+00	2.88E-08	8.65E-12	0.00E+00	1.94E-12	1.06E-11					
Total Dioxins/Furans						4.91E-08	0.00E+00	2.56E-09	5.16E-08	5.62E-07	<1	3.76E-06	<1	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-7
Screening-Level Exposure Evaluation - Grizzly Bear
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-04	0.00E+00	1.66E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.58E+01	4.40E-03	8.32E-03	5.49E-03	1.62E-04	0.00E+00	1.40E-02	9.50E-05	9.55E-03	1.41E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.33E+02	2.71E+00	1.17E+00	1.57E-01	7.86E-04	0.00E+00	1.33E+00	5.85E-02	3.22E-01	1.38E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-05	0.00E+00	3.24E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.48E-05	0.00E+00	6.48E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	0.00E+00	5.87E-04	--	5.87E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04	0.00E+00	3.35E-04	7.33E+00	<1	1.89E+01	<1
Copper	3.32E+01	1.83E-01	1.09E-01	5.54E-02	2.76E-02	0.00E+00	1.92E-01	3.95E-03	2.01E-02	1.96E-01	5.60E+00	<1	8.27E+01	<1
Lead	4.48E+01	3.52E-02	3.14E-02	5.60E-02	1.25E-02	0.00E+00	9.99E-02	7.60E-04	2.71E-02	1.01E-01	4.70E+00	<1	1.86E+02	<1
Manganese	2.21E+03	3.75E+00	2.45E+00	2.75E-01	9.78E-02	0.00E+00	2.82E+00	8.10E-02	1.34E+00	2.90E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	0.00E+00	5.61E-06	--	5.61E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-03	0.00E+00	1.21E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.10E+00	2.00E-03	7.92E-03	3.22E-03	1.48E-03	0.00E+00	1.26E-02	4.32E-05	6.65E-04	1.27E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-06	0.00E+00	7.13E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	2.14E+01	2.48E-02	1.46E-03	2.91E-03	5.68E-04	0.00E+00	4.94E-03	5.36E-04	1.29E-02	5.47E-03	4.16E+00	<1	9.44E+00	<1
Zinc	2.38E+02	5.37E-01	1.41E+00	1.67E+00	2.49E-01	0.00E+00	3.32E+00	1.16E-02	1.44E-01	3.33E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	2.20E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	1.33E-03	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	0.00E+00	4.84E-01	--	4.84E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	0.00E+00	1.34E-05	--	1.34E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05				
Total LMW PAHs							0.00E+00	2.84E-04	0.00E+00	2.84E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	0.00E+00	6.48E-05	--	6.48E-05				
Benzo(a)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	0.00E+00	2.16E-04	--	2.16E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	0.00E+00	8.42E-05	--	8.42E-05				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	0.00E+00	1.64E-04	--	1.64E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	0.00E+00	2.12E-06	--	2.12E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	0.00E+00	6.69E-05	--	6.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	0.00E+00	1.51E-04	--	1.51E-04				
Total HMW PAHs							0.00E+00	7.59E-04	0.00E+00	7.59E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	3.50E-01	2.20E-02	1.17E-04	6.17E-02	5.89E-04	0.00E+00	6.24E-02	4.75E-04	2.12E-04	6.29E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H6-7
Screening-Level Exposure Evaluation - Grizzly Bear
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	1.84E-06	0.00E+00	2.43E-09	1.84E-08	2.41E-09	0.00E+00	2.33E-08	0.00E+00	1.11E-09	2.33E-08				
1,2,3,7,8-PeCDD	3.10E-07	0.00E+00	2.25E-10	2.25E-09	3.40E-10	0.00E+00	2.81E-09	0.00E+00	1.87E-10	2.81E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	4.24E-10	9.72E-09	1.33E-09	0.00E+00	1.15E-09	0.00E+00	6.47E-11	1.15E-09				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	4.39E-10	1.01E-08	1.38E-09	0.00E+00	1.20E-09	0.00E+00	6.71E-11	1.20E-09				
1,2,3,7,8,9-HxCDD	1.29E-06	0.00E+00	5.11E-10	1.21E-08	1.63E-09	0.00E+00	1.43E-09	0.00E+00	7.80E-11	1.43E-09				
1,2,3,4,6,7,8-HpCDD	6.36E-06	0.00E+00	1.38E-09	7.99E-08	9.42E-09	0.00E+00	9.07E-10	0.00E+00	3.85E-11	9.07E-10				
OCDD	3.35E-05	0.00E+00	3.97E-09	5.69E-07	5.85E-08	0.00E+00	1.90E-10	0.00E+00	6.08E-12	1.90E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	3.63E-10	1.99E-09	7.56E-11	0.00E+00	7.29E-10	0.00E+00	5.08E-11	7.29E-10				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	4.15E-10	6.89E-09	2.16E-10	0.00E+00	7.52E-10	0.00E+00	4.84E-11	7.52E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	3.94E-10	6.49E-09	2.05E-10	0.00E+00	7.09E-10	0.00E+00	4.60E-11	7.09E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	6.56E-10	8.13E-09	2.49E-10	0.00E+00	9.03E-10	0.00E+00	5.56E-11	9.03E-10				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	7.89E-10	2.07E-08	5.48E-10	0.00E+00	2.21E-10	0.00E+00	1.23E-11	2.21E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	7.38E-06	0.00E+00	1.58E-09	9.52E-08	1.99E-09	0.00E+00	2.96E-11	0.00E+00	1.34E-12	2.96E-11				
Total Dioxins/Furans						0.00E+00	3.43E-08	0.00E+00	1.77E-09	3.61E-08	5.62E-07	<1	3.76E-06	<1

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.96E-04	0.00E+00	3.96E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.42E+01	4.40E-03	0.00E+00	0.00E+00	3.55E-03	3.55E-03	2.26E-04	1.17E-02	1.55E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.93E+02	2.71E+00	0.00E+00	0.00E+00	1.73E-02	1.73E-02	1.39E-01	4.06E-01	5.62E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-05	0.00E+00	7.72E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	0.00E+00	1.54E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	1.40E-03	--	1.40E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-04	0.00E+00	7.98E-04	7.33E+00	<1	1.89E+01	<1
Copper	2.90E+01	1.83E-01	0.00E+00	0.00E+00	6.45E-01	6.45E-01	9.42E-03	2.39E-02	6.78E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.98E+01	3.52E-02	0.00E+00	0.00E+00	2.08E-01	2.08E-01	1.81E-03	1.63E-02	2.26E-01	4.70E+00	<1	1.86E+02	<1
Manganese	7.45E+02	3.75E+00	0.00E+00	0.00E+00	7.85E-01	7.85E-01	1.93E-01	6.13E-01	1.59E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-03	0.00E+00	2.88E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.05E+00	2.00E-03	0.00E+00	0.00E+00	3.46E-02	3.46E-02	1.03E-04	8.65E-04	3.56E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E-05	0.00E+00	1.70E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.00E+01	2.48E-02	0.00E+00	0.00E+00	1.26E-02	1.26E-02	1.28E-03	1.64E-02	3.03E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.65E+02	5.37E-01	0.00E+00	0.00E+00	5.79E+00	5.79E+00	2.76E-02	1.35E-01	5.96E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	5.82E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	4.79E-04	1.99E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.15E+00	--	1.15E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	3.19E-05	--	3.19E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	4.79E-04	--	4.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05				
Total LMW PAHs						0.00E+00	6.77E-04	0.00E+00	6.77E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	1.54E-04	--	1.54E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	5.15E-04	--	5.15E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	3.91E-04	--	3.91E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	5.04E-06	--	5.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	1.60E-04	--	1.60E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	3.60E-04	--	3.60E-04				
Total HMW PAHs						0.00E+00	1.81E-03	0.00E+00	1.81E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.45E-01	2.20E-02	0.00E+00	0.00E+00	9.82E-03	9.82E-03	1.13E-03	2.02E-04	1.12E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H6-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	0.00E+00	0.00E+00	4.22E-08	4.22E-08	0.00E+00	1.14E-09	4.33E-08				
1,2,3,7,8-PeCDD	1.60E-07	0.00E+00	0.00E+00	0.00E+00	3.92E-09	3.92E-09	0.00E+00	1.32E-10	4.05E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	0.00E+00	3.16E-08	3.16E-09	0.00E+00	8.81E-11	3.25E-09				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	0.00E+00	0.00E+00	7.53E-09	7.53E-10	0.00E+00	2.39E-11	7.77E-10				
1,2,3,7,8,9-HxCDD	6.00E-07	0.00E+00	0.00E+00	0.00E+00	1.68E-08	1.68E-09	0.00E+00	4.94E-11	1.72E-09				
1,2,3,4,6,7,8-HpCDD	2.59E-06	0.00E+00	0.00E+00	0.00E+00	8.36E-08	8.36E-10	0.00E+00	2.13E-11	8.58E-10				
OCDD	1.79E-05	0.00E+00	0.00E+00	0.00E+00	7.00E-07	2.10E-10	0.00E+00	4.42E-12	2.15E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	0.00E+00	0.00E+00	9.85E-10	2.95E-10	0.00E+00	3.78E-11	3.33E-10				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	0.00E+00	0.00E+00	1.51E-09	1.51E-10	0.00E+00	1.93E-11	1.71E-10				
1,2,3,6,7,8-HxCDF	3.63E-07	0.00E+00	0.00E+00	0.00E+00	2.34E-09	2.34E-10	0.00E+00	2.99E-11	2.64E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	0.00E+00	0.00E+00	1.70E-09	1.70E-10	0.00E+00	2.17E-11	1.92E-10				
1,2,3,4,6,7,8-HpCDF	7.25E-07	0.00E+00	0.00E+00	0.00E+00	4.67E-09	4.67E-11	0.00E+00	5.97E-12	5.26E-11				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.22E-06	0.00E+00	0.00E+00	0.00E+00	1.43E-08	4.29E-12	0.00E+00	5.48E-13	4.84E-12				
Total Dioxins/Furans						5.37E-08	0.00E+00	1.58E-09	5.52E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-9
Screening-Level Exposure Evaluation - Meadow Vole
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-03	0.00E+00	1.16E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.42E+01	4.40E-03	8.02E-02	0.00E+00	0.00E+00	8.02E-02	6.61E-04	2.78E-02	1.09E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.93E+02	2.71E+00	1.15E+01	0.00E+00	0.00E+00	1.15E+01	4.07E-01	9.62E-01	1.29E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-04	0.00E+00	2.25E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-04	0.00E+00	4.51E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.09E-03	--	4.09E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-03	0.00E+00	2.33E-03	7.33E+00	<1	1.89E+01	<1
Copper	2.90E+01	1.83E-01	1.10E+00	0.00E+00	0.00E+00	1.10E+00	2.75E-02	5.66E-02	1.19E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.98E+01	3.52E-02	2.12E-01	0.00E+00	0.00E+00	2.12E-01	5.29E-03	3.86E-02	2.56E-01	4.70E+00	<1	1.86E+02	<1
Manganese	7.45E+02	3.75E+00	8.84E+00	0.00E+00	0.00E+00	8.84E+00	5.63E-01	1.45E+00	1.09E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.91E-05	--	3.91E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-03	0.00E+00	8.40E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.05E+00	2.00E-03	8.06E-02	0.00E+00	0.00E+00	8.06E-02	3.00E-04	2.05E-03	8.29E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.96E-05	0.00E+00	4.96E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.00E+01	2.48E-02	1.45E-02	0.00E+00	0.00E+00	1.45E-02	3.73E-03	3.90E-02	5.72E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.65E+02	5.37E-01	1.23E+01	0.00E+00	0.00E+00	1.23E+01	8.07E-02	3.21E-01	1.27E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	5.82E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-02	1.14E-03	5.79E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.37E+00	--	3.37E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.40E-03	--	1.40E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04				
Total LMW PAHs						0.00E+00	1.98E-03	0.00E+00	1.98E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.51E-04	--	4.51E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.50E-03	--	1.50E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.86E-04	--	5.86E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.91E-05	--	6.91E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.47E-05	--	1.47E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.66E-04	--	4.66E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.05E-03	--	1.05E-03				
Total HMW PAHs						0.00E+00	5.28E-03	0.00E+00	5.28E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.45E-01	2.20E-02	8.76E-04	0.00E+00	0.00E+00	8.76E-04	3.31E-03	4.78E-04	4.66E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H6-9
Screening-Level Exposure Evaluation - Meadow Vole
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	1.96E-08	0.00E+00	0.00E+00	1.96E-08	0.00E+00	2.71E-09	2.24E-08				
1,2,3,7,8-PeCDD	1.60E-07	0.00E+00	1.24E-09	0.00E+00	0.00E+00	1.24E-09	0.00E+00	3.12E-10	1.56E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	4.53E-09	0.00E+00	0.00E+00	4.53E-10	0.00E+00	2.09E-10	6.62E-10				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	1.23E-09	0.00E+00	0.00E+00	1.23E-10	0.00E+00	5.66E-11	1.79E-10				
1,2,3,7,8,9-HxCDD	6.00E-07	0.00E+00	2.54E-09	0.00E+00	0.00E+00	2.54E-10	0.00E+00	1.17E-10	3.71E-10				
1,2,3,4,6,7,8-HpCDD	2.59E-06	0.00E+00	6.03E-09	0.00E+00	0.00E+00	6.03E-11	0.00E+00	5.06E-11	1.11E-10				
OCDD	1.79E-05	0.00E+00	2.27E-08	0.00E+00	0.00E+00	6.82E-12	0.00E+00	1.05E-11	1.73E-11				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	2.12E-09	0.00E+00	0.00E+00	6.37E-10	0.00E+00	8.96E-11	7.26E-10				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	1.31E-09	0.00E+00	0.00E+00	1.31E-10	0.00E+00	4.59E-11	1.76E-10				
1,2,3,6,7,8-HxCDF	3.63E-07	0.00E+00	2.02E-09	0.00E+00	0.00E+00	2.02E-10	0.00E+00	7.09E-11	2.73E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	2.01E-09	0.00E+00	0.00E+00	2.01E-10	0.00E+00	5.16E-11	2.53E-10				
1,2,3,4,6,7,8-HpCDF	7.25E-07	0.00E+00	3.01E-09	0.00E+00	0.00E+00	3.01E-11	0.00E+00	1.42E-11	4.43E-11				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.22E-06	0.00E+00	5.08E-09	0.00E+00	0.00E+00	1.52E-12	0.00E+00	1.30E-12	2.82E-12				
Total Dioxins/Furans						2.30E-08	0.00E+00	3.74E-09	2.67E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-10
Screening-Level Exposure Evaluation - North American Wolverine
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-04	0.00E+00	2.31E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	1.42E+01	4.40E-03	0.00E+00	0.00E+00	2.07E-03	2.07E-03	1.32E-04	1.20E-02	1.42E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.93E+02	2.71E+00	0.00E+00	0.00E+00	1.01E-02	1.01E-02	8.14E-02	4.14E-01	5.06E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	0.00E+00	4.51E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	0.00E+00	9.01E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.17E-04	--	8.17E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-04	0.00E+00	4.66E-04	7.33E+00	<1	1.89E+01	<1
Copper	2.90E+01	1.83E-01	0.00E+00	0.00E+00	3.76E-01	3.76E-01	5.50E-03	2.44E-02	4.06E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.98E+01	3.52E-02	0.00E+00	0.00E+00	1.21E-01	1.21E-01	1.06E-03	1.66E-02	1.39E-01	4.70E+00	<1	1.86E+02	<1
Manganese	7.45E+02	3.75E+00	0.00E+00	0.00E+00	4.59E-01	4.59E-01	1.13E-01	6.26E-01	1.20E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	7.81E-06	--	7.81E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-03	0.00E+00	1.68E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.05E+00	2.00E-03	0.00E+00	0.00E+00	2.02E-02	2.02E-02	6.01E-05	8.83E-04	2.11E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.92E-06	0.00E+00	9.92E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	2.00E+01	2.48E-02	0.00E+00	0.00E+00	7.37E-03	7.37E-03	7.45E-04	1.68E-02	2.49E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.65E+02	5.37E-01	0.00E+00	0.00E+00	3.38E+00	3.38E+00	1.61E-02	1.38E-01	3.54E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	5.82E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	4.89E-04	1.18E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	6.73E-01	--	6.73E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.86E-05	--	1.86E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05				
Total LMW PAHs						0.00E+00	3.95E-04	0.00E+00	3.95E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	9.01E-05	--	9.01E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.00E-04	--	3.00E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	2.94E-06	--	2.94E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.10E-04	--	2.10E-04				
Total HMW PAHs						0.00E+00	1.06E-03	0.00E+00	1.06E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.45E-01	2.20E-02	0.00E+00	0.00E+00	5.73E-03	5.73E-03	6.61E-04	2.06E-04	6.60E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H6-10
Screening-Level Exposure Evaluation - North American Wolverine
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	1.39E-06	0.00E+00	0.00E+00	0.00E+00	2.46E-08	2.46E-08	0.00E+00	1.17E-09	2.58E-08					
1,2,3,7,8-PeCDD	1.60E-07	0.00E+00	0.00E+00	0.00E+00	2.29E-09	2.29E-09	0.00E+00	1.35E-10	2.42E-09					
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	0.00E+00	1.85E-08	1.85E-09	0.00E+00	9.00E-11	1.94E-09					
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	0.00E+00	0.00E+00	4.40E-09	4.40E-10	0.00E+00	2.44E-11	4.64E-10					
1,2,3,7,8,9-HxCDD	6.00E-07	0.00E+00	0.00E+00	0.00E+00	9.78E-09	9.78E-10	0.00E+00	5.05E-11	1.03E-09					
1,2,3,4,6,7,8-HpCDD	2.59E-06	0.00E+00	0.00E+00	0.00E+00	4.88E-08	4.88E-10	0.00E+00	2.18E-11	5.10E-10					
OCDD	1.79E-05	0.00E+00	0.00E+00	0.00E+00	4.09E-07	1.23E-10	0.00E+00	4.52E-12	1.27E-10					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	0.00E+00	0.00E+00	5.75E-10	1.73E-10	0.00E+00	3.86E-11	2.11E-10					
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	0.00E+00	0.00E+00	8.83E-10	8.83E-11	0.00E+00	1.98E-11	1.08E-10					
1,2,3,6,7,8-HxCDF	3.63E-07	0.00E+00	0.00E+00	0.00E+00	1.36E-09	1.36E-10	0.00E+00	3.05E-11	1.67E-10					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	0.00E+00	0.00E+00	9.92E-10	9.92E-11	0.00E+00	2.22E-11	1.21E-10					
1,2,3,4,6,7,8-HpCDF	7.25E-07	0.00E+00	0.00E+00	0.00E+00	2.73E-09	2.73E-11	0.00E+00	6.10E-12	3.33E-11					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	2.22E-06	0.00E+00	0.00E+00	0.00E+00	8.34E-09	2.50E-12	0.00E+00	5.60E-13	3.06E-12					
Total Dioxins/Furans						3.13E-08	0.00E+00	1.61E-09	3.29E-08	5.62E-07	<1	3.76E-06	<1	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H6-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	7.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-03	0.00E+00	1.03E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.42E+01	4.40E-03	0.00E+00	2.11E-01	0.00E+00	2.11E-01	5.90E-04	2.10E-02	2.32E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.93E+02	2.71E+00	0.00E+00	6.01E+00	0.00E+00	6.01E+00	3.63E-01	7.26E-01	7.10E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	1.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	0.00E+00	2.01E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-04	0.00E+00	4.02E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.65E-03	--	3.65E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-03	0.00E+00	2.08E-03	7.33E+00	<1	1.89E+01	<1
Copper	2.90E+01	1.83E-01	0.00E+00	2.00E+00	0.00E+00	2.00E+00	2.45E-02	4.27E-02	2.07E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.98E+01	3.52E-02	0.00E+00	1.20E+00	0.00E+00	1.20E+00	4.72E-03	2.91E-02	1.23E+00	4.70E+00	<1	1.86E+02	<1
Manganese	7.45E+02	3.75E+00	0.00E+00	5.43E+00	0.00E+00	5.43E+00	5.03E-01	1.10E+00	7.03E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.48E-05	--	3.48E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.49E-03	0.00E+00	7.49E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.05E+00	2.00E-03	0.00E+00	1.29E-01	0.00E+00	1.29E-01	2.68E-04	1.55E-03	1.31E-01	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	3.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-05	0.00E+00	4.42E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	2.00E+01	2.48E-02	0.00E+00	1.12E-01	0.00E+00	1.12E-01	3.32E-03	2.94E-02	1.45E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.65E+02	5.37E-01	0.00E+00	6.11E+01	0.00E+00	6.11E+01	7.20E-02	2.42E-01	6.14E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	5.82E-01	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	8.57E-04	5.15E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.00E+00	--	3.00E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.25E-03	--	1.25E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Naphthalene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Total LMW PAHs						0.00E+00	1.76E-03	0.00E+00	1.76E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.02E-04	--	4.02E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.34E-03	--	1.34E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.23E-04	--	5.23E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.02E-03	--	1.02E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.31E-05	--	1.31E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.15E-04	--	4.15E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	9.38E-04	--	9.38E-04				
Total HMW PAHs						0.00E+00	4.71E-03	0.00E+00	4.71E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.45E-01	2.20E-02	0.00E+00	1.79E+00	0.00E+00	1.79E+00	2.95E-03	3.61E-04	1.79E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H6-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	0.00E+00	5.48E-07	0.00E+00	5.48E-07	0.00E+00	2.05E-09	5.50E-07				
1,2,3,7,8-PeCDD	1.60E-07	0.00E+00	0.00E+00	4.25E-08	0.00E+00	4.25E-08	0.00E+00	2.36E-10	4.28E-08				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	4.02E-07	0.00E+00	4.02E-08	0.00E+00	1.58E-10	4.04E-08				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	0.00E+00	8.59E-08	0.00E+00	8.59E-09	0.00E+00	4.28E-11	8.63E-09				
1,2,3,7,8,9-HxCDD	6.00E-07	0.00E+00	0.00E+00	2.03E-07	0.00E+00	2.03E-08	0.00E+00	8.84E-11	2.04E-08				
1,2,3,4,6,7,8-HpCDD	2.59E-06	0.00E+00	0.00E+00	1.14E-06	0.00E+00	1.14E-08	0.00E+00	3.82E-11	1.15E-08				
OCDD	1.79E-05	0.00E+00	0.00E+00	1.12E-05	0.00E+00	3.37E-09	0.00E+00	7.92E-12	3.38E-09				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	0.00E+00	4.03E-08	0.00E+00	1.21E-08	0.00E+00	6.77E-11	1.22E-08				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	0.00E+00	6.70E-08	0.00E+00	6.70E-09	0.00E+00	3.46E-11	6.74E-09				
1,2,3,6,7,8-HxCDF	3.63E-07	0.00E+00	0.00E+00	1.12E-07	0.00E+00	1.12E-08	0.00E+00	5.35E-11	1.13E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	0.00E+00	7.69E-08	0.00E+00	7.69E-09	0.00E+00	3.89E-11	7.73E-09				
1,2,3,4,6,7,8-HpCDF	7.25E-07	0.00E+00	0.00E+00	2.54E-07	0.00E+00	2.54E-09	0.00E+00	1.07E-11	2.55E-09				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.22E-06	0.00E+00	0.00E+00	9.53E-07	0.00E+00	2.86E-10	0.00E+00	9.82E-13	2.87E-10				
Total Dioxins/Furans						7.15E-07	0.00E+00	2.83E-09	7.17E-07	5.62E-07	1.28E+00	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	5.70E+00	3.75E-02	2.14E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.25E-01	Sample et al. (1999)	Regression ^f	3.26E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	2.36E+02	1.56E-01	3.68E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.15E+01	Sample et al. (1998a)	6.83E-04	1.61E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	2.27E+01	Regression ^a	6.67E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.17E+01	Sample et al. (1998a)	Regression ^f	1.21E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	1.24E+01	Regression ^a	1.09E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.13E+00	Sample et al. (1999)	Regression ^f	3.29E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	4.67E+02	7.90E-02	3.69E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.95E+01	Sample et al. (1999)	2.05E-02	9.57E+00	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	5.63E+01	Regression ^a	4.51E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.21E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	1.90E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	8.10E-01	1.22E+01	9.88E+00	USEPA (2007a)	4.40E+00	3.56E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H7-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	1.40E-02	8.14E-01	1.14E-02	USEPA (2007a)	1.03E+01	1.44E-01	USEPA (2007a)	4.49E-01	6.29E-03	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H7-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H7-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H7-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	2.45E+01	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	7.70E-03	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	4.40E-03	7.58E+00	3.75E-02	2.84E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.01E+00	Sample et al. (1999)	Regression ^f	4.12E-02	Sample et al. (1998b)
Barium	NA	2.71E+00	1.84E+02	1.56E-01	2.87E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.67E+01	Sample et al. (1998a)	6.83E-04	1.25E-01	Baes et al. (1984) ^e
Beryllium	NA	1.50E-03	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.00E-03	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	2.72E-02	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.55E-02	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	1.83E-01	1.83E+01	Regression ^a	6.13E+00	Bechtel-Jacobs (1998a)	5.15E-01	9.44E+00	Sample et al. (1998a)	Regression ^f	1.17E+01	Sample et al. (1998b)
Lead	NA	3.52E-02	1.22E+01	Regression ^a	1.08E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.05E+00	Sample et al. (1999)	Regression ^f	3.26E+00	Sample et al. (1998b)
Manganese	NA	3.75E+00	3.76E+02	7.90E-02	2.97E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.54E+01	Sample et al. (1999)	2.05E-02	7.71E+00	Sample et al. (1998b) ⁱ
Mercury	NA	2.60E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	5.59E-02	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	2.00E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.30E-04	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	2.48E-02	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	5.37E-01	4.86E+01	Regression ^a	4.15E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.06E+02	Sample et al. (1998a)	Regression ^f	1.03E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	3.25E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	6.20E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	9.30E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	8.70E-04	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	8.70E-04	3.60E-01	1.22E+01	4.39E+00	USEPA (2007a)	4.40E+00	1.58E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	1.50E-03	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H7-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	3.00E-03	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E-02	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	3.90E-03	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	4.60E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	7.60E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	9.80E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.10E-03	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	7.00E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	2.70E-02	8.14E-01	2.20E-02	USEPA (2007a)	1.03E+01	2.78E-01	USEPA (2007a)	4.49E-01	1.21E-02	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H7-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H7-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H7-2
Screening-Level Exposure Evaluation - American Woodcock
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	9.05E-04	--	9.05E-04	No TRV	--	No TRV	--
Arsenic	5.70E+00	4.40E-03	2.51E-03	8.72E-02	0.00E+00	8.98E-02	5.17E-04	5.02E-02	1.40E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.36E+02	2.71E+00	4.33E-01	2.27E+00	0.00E+00	2.70E+00	3.18E-01	2.08E+00	5.10E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04	No TRV	--	No TRV	--
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	3.52E-04	--	3.52E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.20E-03	--	3.20E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-03	0.00E+00	1.82E-03	7.61E+00	<1	2.02E+01	<1
Copper	2.27E+01	1.83E-01	7.84E-02	1.24E+00	0.00E+00	1.31E+00	2.15E-02	2.00E-01	1.54E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.24E+01	3.52E-02	1.28E-02	6.49E-01	0.00E+00	6.61E-01	4.14E-03	1.09E-01	7.75E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.67E+02	3.75E+00	4.33E-01	3.11E+00	0.00E+00	3.55E+00	4.41E-01	4.11E+00	8.10E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.05E-05	--	3.05E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-03	0.00E+00	6.57E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-04	0.00E+00	2.35E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	3.88E-05	--	3.88E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-03	0.00E+00	2.91E-03	3.44E-01	<1	1.70E+00	<1
Zinc	5.63E+01	5.37E-01	5.29E-01	3.39E+01	0.00E+00	3.45E+01	6.31E-02	4.96E-01	3.50E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-02	1.67E-02	6.11E-02	4.00E-02	1.53E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.63E+00	--	2.63E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.09E-03	--	1.09E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04				
Naphthalene	8.10E-01	8.70E-04	1.16E-01	3.77E-01	0.00E+00	4.93E-01	1.02E-04	7.14E-03	5.00E-01				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.76E-04	--	1.76E-04				
Total LMW PAHs						4.93E-01	1.55E-03	7.14E-03	5.02E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	3.52E-04	--	3.52E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.17E-03	--	1.17E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.58E-04	--	4.58E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.40E-05	--	5.40E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.93E-04	--	8.93E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.15E-05	--	1.15E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.64E-04	--	3.64E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	8.22E-04	--	8.22E-04				
Total HMW PAHs						0.00E+00	4.13E-03	0.00E+00	4.13E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	2.58E-03	--	2.58E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	1.34E-04	1.53E-02	0.00E+00	1.54E-02	0.00E+00	1.23E-04	1.55E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H7-2
Screening-Level Exposure Evaluation - American Woodcock
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-3
Screening-Level Exposure Evaluation - Mourning Dove
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	8.79E-04	--	8.79E-04	No TRV	--	No TRV	--
Arsenic	5.70E+00	4.40E-03	2.44E-02	0.00E+00	0.00E+00	2.44E-02	5.02E-04	4.42E-02	6.92E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.36E+02	2.71E+00	4.20E+00	0.00E+00	0.00E+00	4.20E+00	3.09E-01	1.83E+00	6.34E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04	No TRV	--	No TRV	--
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	3.42E-04	--	3.42E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.10E-03	--	3.10E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	0.00E+00	1.77E-03	7.61E+00	<1	2.02E+01	<1
Copper	2.27E+01	1.83E-01	7.62E-01	0.00E+00	0.00E+00	7.62E-01	2.09E-02	1.76E-01	9.59E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.24E+01	3.52E-02	1.24E-01	0.00E+00	0.00E+00	1.24E-01	4.02E-03	9.62E-02	2.24E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.67E+02	3.75E+00	4.21E+00	0.00E+00	0.00E+00	4.21E+00	4.28E-01	3.62E+00	8.26E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.38E-03	0.00E+00	6.38E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	0.00E+00	2.28E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-03	0.00E+00	2.83E-03	3.44E-01	<1	1.70E+00	<1
Zinc	5.63E+01	5.37E-01	5.14E+00	0.00E+00	0.00E+00	5.14E+00	6.13E-02	4.37E-01	5.64E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-02	1.47E-02	5.79E-02	4.00E-02	1.45E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	2.56E+00	--	2.56E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	7.08E-05	--	7.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.06E-03	--	1.06E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	9.93E-05	--	9.93E-05				
Naphthalene	8.10E-01	8.70E-04	1.13E+00	0.00E+00	0.00E+00	1.13E+00	9.93E-05	6.29E-03	1.13E+00				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.71E-04	--	1.71E-04				
Total LMW PAHs						1.13E+00	1.50E-03	6.29E-03	1.14E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	3.42E-04	--	3.42E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	4.45E-04	--	4.45E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	5.25E-05	--	5.25E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	8.67E-04	--	8.67E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.12E-05	--	1.12E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	3.54E-04	--	3.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	7.99E-04	--	7.99E-04				
Total HMW PAHs						0.00E+00	4.01E-03	0.00E+00	4.01E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	2.51E-03	--	2.51E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	1.30E-03	0.00E+00	0.00E+00	1.30E-03	0.00E+00	1.09E-04	1.41E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H7-3
Screening-Level Exposure Evaluation - Mourning Dove
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	6.31E-04	--	6.31E-04	No TRV	--	No TRV	--
Arsenic	5.70E+00	4.40E-03	0.00E+00	0.00E+00	2.68E-03	2.68E-03	3.61E-04	1.22E-02	1.52E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.36E+02	2.71E+00	0.00E+00	0.00E+00	1.32E-02	1.32E-02	2.22E-01	5.03E-01	7.39E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04	No TRV	--	No TRV	--
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	2.46E-04	--	2.46E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	2.23E-03	--	2.23E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	0.00E+00	1.27E-03	7.61E+00	<1	2.02E+01	<1
Copper	2.27E+01	1.83E-01	0.00E+00	0.00E+00	9.92E-01	9.92E-01	1.50E-02	4.84E-02	1.06E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.24E+01	3.52E-02	0.00E+00	0.00E+00	2.69E-01	2.69E-01	2.89E-03	2.64E-02	2.99E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.67E+02	3.75E+00	0.00E+00	0.00E+00	7.85E-01	7.85E-01	3.08E-01	9.96E-01	2.09E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	2.13E-05	--	2.13E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.58E-03	0.00E+00	4.58E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-04	0.00E+00	1.64E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	2.71E-05	--	2.71E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-03	0.00E+00	2.03E-03	3.44E-01	<1	1.70E+00	<1
Zinc	5.63E+01	5.37E-01	0.00E+00	0.00E+00	8.56E+00	8.56E+00	4.40E-02	1.20E-01	8.72E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	4.05E-03	3.51E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.84E+00	--	1.84E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	5.08E-05	--	5.08E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	7.63E-04	--	7.63E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	7.13E-05	--	7.13E-05				
Naphthalene	8.10E-01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.13E-05	1.73E-03	1.80E-03				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	1.23E-04	--	1.23E-04				
Total LMW PAHs						0.00E+00	1.08E-03	1.73E-03	2.81E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	2.46E-04	--	2.46E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	8.20E-04	--	8.20E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	3.20E-04	--	3.20E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	3.77E-05	--	3.77E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	6.23E-04	--	6.23E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	8.04E-06	--	8.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	2.54E-04	--	2.54E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	5.74E-04	--	5.74E-04				
Total HMW PAHs						0.00E+00	2.88E-03	0.00E+00	2.88E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	1.80E-03	--	1.80E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	0.00E+00	0.00E+00	5.16E-04	5.16E-04	0.00E+00	2.99E-05	5.45E-04	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H7-4
Screening-Level Exposure Evaluation - Red-tailed Hawk
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.22E-03	--	1.22E-03	No TRV	--	No TRV	--
Arsenic	5.70E+00	4.40E-03	0.00E+00	1.31E-01	0.00E+00	1.31E-01	6.97E-04	0.00E+00	1.31E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.36E+02	2.71E+00	0.00E+00	3.40E+00	0.00E+00	3.40E+00	4.29E-01	0.00E+00	3.83E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04	No TRV	--	No TRV	--
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	4.75E-04	--	4.75E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.31E-03	--	4.31E-03	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-03	0.00E+00	2.45E-03	7.61E+00	<1	2.02E+01	<1
Copper	2.27E+01	1.83E-01	0.00E+00	1.85E+00	0.00E+00	1.85E+00	2.90E-02	0.00E+00	1.88E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.24E+01	3.52E-02	0.00E+00	9.71E-01	0.00E+00	9.71E-01	5.57E-03	0.00E+00	9.77E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.67E+02	3.75E+00	0.00E+00	4.66E+00	0.00E+00	4.66E+00	5.94E-01	0.00E+00	5.26E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	4.12E-05	--	4.12E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-03	0.00E+00	8.85E-03	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-04	0.00E+00	3.17E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	5.22E-05	--	5.22E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-03	0.00E+00	3.93E-03	3.44E-01	<1	1.70E+00	<1
Zinc	5.63E+01	5.37E-01	0.00E+00	5.08E+01	0.00E+00	5.08E+01	8.50E-02	0.00E+00	5.09E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E-02	0.00E+00	5.98E-02	4.00E-02	1.50E+00	4.00E-01	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.55E+00	--	3.55E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.82E-05	--	9.82E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.47E-03	--	1.47E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.38E-04	--	1.38E-04				
Naphthalene	8.10E-01	8.70E-04	0.00E+00	5.64E-01	0.00E+00	5.64E-01	1.38E-04	0.00E+00	5.64E-01				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Total LMW PAHs						5.64E-01	2.08E-03	0.00E+00	5.66E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.75E-04	--	4.75E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.58E-03	--	1.58E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	6.17E-04	--	6.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	7.28E-05	--	7.28E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.20E-03	--	1.20E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.55E-05	--	1.55E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.91E-04	--	4.91E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.11E-03	--	1.11E-03				
Total HMW PAHs						0.00E+00	5.57E-03	0.00E+00	5.57E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	3.48E-03	--	3.48E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	0.00E+00	2.29E-02	0.00E+00	2.29E-02	0.00E+00	0.00E+00	2.29E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H7-5
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-6
Screening-Level Exposure Evaluation - Canada Lynx
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	2.41E-04	--	2.41E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	5.70E+00	4.40E-03	0.00E+00	0.00E+00	1.02E-03	1.02E-03	1.37E-04	4.99E-03	6.14E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.36E+02	2.71E+00	0.00E+00	0.00E+00	5.03E-03	5.03E-03	8.47E-02	2.06E-01	2.96E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	9.37E-05	--	9.37E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.50E-04	--	8.50E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-04	0.00E+00	4.84E-04	7.33E+00	<1	1.89E+01	<1
Copper	2.27E+01	1.83E-01	0.00E+00	0.00E+00	3.78E-01	3.78E-01	5.72E-03	1.99E-02	4.04E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.24E+01	3.52E-02	0.00E+00	0.00E+00	1.03E-01	1.03E-01	1.10E-03	1.08E-02	1.15E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.67E+02	3.75E+00	0.00E+00	0.00E+00	2.99E-01	2.99E-01	1.17E-01	4.09E-01	8.25E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	8.12E-06	--	8.12E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-03	0.00E+00	1.75E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.25E-05	0.00E+00	6.25E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	1.03E-05	--	1.03E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.75E-04	0.00E+00	7.75E-04	4.16E+00	<1	9.44E+00	<1
Zinc	5.63E+01	5.37E-01	0.00E+00	0.00E+00	3.26E+00	3.26E+00	1.68E-02	4.93E-02	3.33E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-02	1.66E-03	1.35E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	7.00E-01	--	7.00E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.94E-05	--	1.94E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.72E-05	--	2.72E-05				
Naphthalene	8.10E-01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-05	7.09E-04	2.72E-05	7.36E-04			
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.69E-05	--	4.69E-05				
Total LMW PAHs						0.00E+00	4.11E-04	7.09E-04	1.12E-03	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	9.37E-05	--	9.37E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.12E-04	--	3.12E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.22E-04	--	1.22E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.37E-04	--	2.37E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	3.06E-06	--	3.06E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.69E-05	--	9.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.19E-04	--	2.19E-04				
Total HMW PAHs						0.00E+00	1.10E-03	0.00E+00	1.10E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	6.87E-04	--	6.87E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	0.00E+00	0.00E+00	1.96E-04	1.96E-04	0.00E+00	1.22E-05	2.09E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H7-6
Screening-Level Exposure Evaluation - Canada Lynx
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

EHS Support

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Table H7-7
Screening-Level Exposure Evaluation - Grizzly Bear
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	0.00E+00	1.66E-04	--	1.66E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	5.70E+00	4.40E-03	3.00E-03	2.67E-03	7.05E-05	0.00E+00	5.75E-03	9.50E-05	3.45E-03	5.84E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.36E+02	2.71E+00	5.17E-01	6.96E-02	3.48E-04	0.00E+00	5.87E-01	5.85E-02	1.43E-01	6.45E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	0.00E+00	6.48E-05	--	6.48E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	0.00E+00	5.87E-04	--	5.87E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-04	0.00E+00	3.35E-04	7.33E+00	<1	1.89E+01	<1
Copper	2.27E+01	1.83E-01	9.37E-02	3.79E-02	2.61E-02	0.00E+00	1.58E-01	3.95E-03	1.37E-02	1.62E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.24E+01	3.52E-02	1.53E-02	1.99E-02	7.09E-03	0.00E+00	4.22E-02	7.60E-04	7.50E-03	4.30E-02	4.70E+00	<1	1.86E+02	<1
Manganese	4.67E+02	3.75E+00	5.18E-01	9.54E-02	2.07E-02	0.00E+00	6.34E-01	8.10E-02	2.82E-01	7.15E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	0.00E+00	5.61E-06	--	5.61E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-03	0.00E+00	1.21E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-05	0.00E+00	4.32E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	0.00E+00	7.13E-06	--	7.13E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-04	0.00E+00	5.36E-04	4.16E+00	<1	9.44E+00	<1
Zinc	5.63E+01	5.37E-01	6.33E-01	1.04E+00	2.25E-01	0.00E+00	1.90E+00	1.16E-02	3.40E-02	1.91E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.90E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.16E-03	1.15E-03	8.16E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	0.00E+00	4.84E-01	--	4.84E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	0.00E+00	1.34E-05	--	1.34E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	0.00E+00	1.88E-05	--	1.88E-05				
Naphthalene	8.10E-01	8.70E-04	1.39E-01	1.15E-02	0.00E+00	0.00E+00	1.50E-01	1.88E-05	4.90E-04	1.50E-01				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	0.00E+00	3.24E-05	--	3.24E-05				
Total LMW PAHs							1.50E-01	2.84E-04	4.90E-04	1.51E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	0.00E+00	6.48E-05	--	6.48E-05				
Benzo(a)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	0.00E+00	2.16E-04	--	2.16E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	0.00E+00	8.42E-05	--	8.42E-05				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	0.00E+00	9.93E-06	--	9.93E-06				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	0.00E+00	1.64E-04	--	1.64E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	0.00E+00	2.12E-06	--	2.12E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	0.00E+00	6.69E-05	--	6.69E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	0.00E+00	1.51E-04	--	1.51E-04				
Total HMW PAHs							0.00E+00	7.59E-04	0.00E+00	7.59E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	0.00E+00	4.75E-04	--	4.75E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	1.60E-04	4.68E-04	1.36E-05	0.00E+00	6.41E-04	0.00E+00	8.47E-06	6.41E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H7-7
Screening-Level Exposure Evaluation - Grizzly Bear
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	3.96E-04	--	3.96E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	7.58E+00	4.40E-03	0.00E+00	0.00E+00	2.12E-03	2.12E-03	2.26E-04	6.24E-03	8.58E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.84E+02	2.71E+00	0.00E+00	0.00E+00	6.45E-03	6.45E-03	1.39E-01	1.51E-01	2.97E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	1.54E-04	--	1.54E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	1.40E-03	--	1.40E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.98E-04	0.00E+00	7.98E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.83E+01	1.83E-01	0.00E+00	0.00E+00	6.04E-01	6.04E-01	9.42E-03	1.51E-02	6.28E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	3.52E-02	0.00E+00	0.00E+00	1.68E-01	1.68E-01	1.81E-03	1.00E-02	1.80E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.76E+02	3.75E+00	0.00E+00	0.00E+00	3.97E-01	3.97E-01	1.93E-01	3.10E-01	9.00E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-03	0.00E+00	2.88E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-04	0.00E+00	1.03E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	1.70E-05	--	1.70E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	0.00E+00	1.28E-03	4.16E+00	<1	9.44E+00	<1
Zinc	4.86E+01	5.37E-01	0.00E+00	0.00E+00	5.31E+00	5.31E+00	2.76E-02	4.00E-02	5.38E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	3.25E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-02	2.68E-03	2.21E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	1.15E+00	--	1.15E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	3.19E-05	--	3.19E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	4.79E-04	--	4.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	4.48E-05	--	4.48E-05				
Naphthalene	3.60E-01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-05	2.96E-04	3.41E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	7.72E-05	--	7.72E-05				
Total LMW PAHs						0.00E+00	6.77E-04	2.96E-04	9.74E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	1.54E-04	--	1.54E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	5.15E-04	--	5.15E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	2.37E-05	--	2.37E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	3.91E-04	--	3.91E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	5.04E-06	--	5.04E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	1.60E-04	--	1.60E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	3.60E-04	--	3.60E-04				
Total HMW PAHs						0.00E+00	1.81E-03	0.00E+00	1.81E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	1.13E-03	--	1.13E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	0.00E+00	0.00E+00	6.24E-04	6.24E-04	0.00E+00	2.22E-05	6.46E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H7-8
Screening-Level Exposure Evaluation - Long-tailed Weasel
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-9
Screening-Level Exposure Evaluation - Meadow Vole
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.16E-03	--	1.16E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	7.58E+00	4.40E-03	4.27E-02	0.00E+00	0.00E+00	4.27E-02	6.61E-04	1.48E-02	5.82E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.84E+02	2.71E+00	4.31E+00	0.00E+00	0.00E+00	4.31E+00	4.07E-01	3.59E-01	5.07E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	4.51E-04	--	4.51E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	4.09E-03	--	4.09E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-03	0.00E+00	2.33E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.83E+01	1.83E-01	9.22E-01	0.00E+00	0.00E+00	9.22E-01	2.75E-02	3.58E-02	9.85E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	3.52E-02	1.62E-01	0.00E+00	0.00E+00	1.62E-01	5.29E-03	2.38E-02	1.91E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.76E+02	3.75E+00	4.47E+00	0.00E+00	0.00E+00	4.47E+00	5.63E-01	7.35E-01	5.76E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.91E-05	--	3.91E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-03	0.00E+00	8.40E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	0.00E+00	3.00E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	4.96E-05	--	4.96E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-03	0.00E+00	3.73E-03	4.16E+00	<1	9.44E+00	<1
Zinc	4.86E+01	5.37E-01	6.24E+00	0.00E+00	0.00E+00	6.24E+00	8.07E-02	9.49E-02	6.42E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	3.25E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-02	6.35E-03	6.31E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.37E+00	--	3.37E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.40E-03	--	1.40E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.31E-04	--	1.31E-04				
Naphthalene	3.60E-01	8.70E-04	6.60E-01	0.00E+00	0.00E+00	6.60E-01	1.31E-04	7.03E-04	6.61E-01				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.25E-04	--	2.25E-04				
Total LMW PAHs						6.60E-01	1.98E-03	7.03E-04	6.63E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.51E-04	--	4.51E-04				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.50E-03	--	1.50E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.86E-04	--	5.86E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.91E-05	--	6.91E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.14E-03	--	1.14E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.47E-05	--	1.47E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.66E-04	--	4.66E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	1.05E-03	--	1.05E-03				
Total HMW PAHs						0.00E+00	5.28E-03	0.00E+00	5.28E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	3.31E-03	--	3.31E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	3.30E-03	0.00E+00	0.00E+00	3.30E-03	0.00E+00	5.27E-05	3.36E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H7-9
Screening-Level Exposure Evaluation - Meadow Vole
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-10
Screening-Level Exposure Evaluation - North American Wolverine
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	2.31E-04	--	2.31E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	7.58E+00	4.40E-03	0.00E+00	0.00E+00	1.24E-03	1.24E-03	1.32E-04	6.37E-03	7.74E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.84E+02	2.71E+00	0.00E+00	0.00E+00	3.77E-03	3.77E-03	8.14E-02	1.55E-01	2.40E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	9.01E-05	--	9.01E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	8.17E-04	--	8.17E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-04	0.00E+00	4.66E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.83E+01	1.83E-01	0.00E+00	0.00E+00	3.52E-01	3.52E-01	5.50E-03	1.54E-02	3.73E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	3.52E-02	0.00E+00	0.00E+00	9.80E-02	9.80E-02	1.06E-03	1.03E-02	1.09E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.76E+02	3.75E+00	0.00E+00	0.00E+00	2.32E-01	2.32E-01	1.13E-01	3.17E-01	6.61E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	7.81E-06	--	7.81E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-03	0.00E+00	1.68E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.01E-05	0.00E+00	6.01E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	9.92E-06	--	9.92E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.45E-04	0.00E+00	7.45E-04	4.16E+00	<1	9.44E+00	<1
Zinc	4.86E+01	5.37E-01	0.00E+00	0.00E+00	3.10E+00	3.10E+00	1.61E-02	4.09E-02	3.16E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	3.25E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	2.73E-03	1.41E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	6.73E-01	--	6.73E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	1.86E-05	--	1.86E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	2.61E-05	--	2.61E-05				
Naphthalene	3.60E-01	8.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05	3.03E-04	3.29E-04				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	4.51E-05	--	4.51E-05				
Total LMW PAHs						0.00E+00	3.95E-04	3.03E-04	6.98E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	9.01E-05	--	9.01E-05				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	3.00E-04	--	3.00E-04				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	1.38E-05	--	1.38E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	2.94E-06	--	2.94E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	9.31E-05	--	9.31E-05				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	2.10E-04	--	2.10E-04				
Total HMW PAHs						0.00E+00	1.06E-03	0.00E+00	1.06E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	6.61E-04	--	6.61E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	0.00E+00	0.00E+00	3.64E-04	3.64E-04	0.00E+00	2.27E-05	3.87E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													

Table H7-10
Screening-Level Exposure Evaluation - North American Wolverine
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H7-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	ND	7.70E-03	--	--	--	0.00E+00	1.03E-03	--	1.03E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	7.58E+00	4.40E-03	0.00E+00	1.35E-01	0.00E+00	1.35E-01	5.90E-04	1.12E-02	1.47E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.84E+02	2.71E+00	0.00E+00	2.24E+00	0.00E+00	2.24E+00	3.63E-01	2.71E-01	2.87E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	3.00E-03	--	--	--	0.00E+00	4.02E-04	--	4.02E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.72E-02	--	--	--	0.00E+00	3.65E-03	--	3.65E-03	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-03	0.00E+00	2.08E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.83E+01	1.83E-01	0.00E+00	1.26E+00	0.00E+00	1.26E+00	2.45E-02	2.70E-02	1.32E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	3.52E-02	0.00E+00	8.11E-01	0.00E+00	8.11E-01	4.72E-03	1.80E-02	8.34E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.76E+02	3.75E+00	0.00E+00	3.41E+00	0.00E+00	3.41E+00	5.03E-01	5.55E-01	4.46E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	2.60E-04	--	--	--	0.00E+00	3.48E-05	--	3.48E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	5.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.49E-03	0.00E+00	7.49E-03	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	2.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.68E-04	0.00E+00	2.68E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	3.30E-04	--	--	--	0.00E+00	4.42E-05	--	4.42E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E-03	0.00E+00	3.32E-03	4.16E+00	<1	9.44E+00	<1
Zinc	4.86E+01	5.37E-01	0.00E+00	4.10E+01	0.00E+00	4.10E+01	7.20E-02	7.16E-02	4.11E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	3.25E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.07E-02	4.79E-03	5.54E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	2.24E+01	--	--	--	0.00E+00	3.00E+00	--	3.00E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	6.20E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Fluoranthene	ND	9.30E-03	--	--	--	0.00E+00	1.25E-03	--	1.25E-03				
Fluorene	ND	8.70E-04	--	--	--	0.00E+00	1.17E-04	--	1.17E-04				
Naphthalene	3.60E-01	8.70E-04	0.00E+00	2.12E-01	0.00E+00	2.12E-01	1.17E-04	5.31E-04	2.13E-01				
Phenanthrene	ND	1.50E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Total LMW PAHs						2.12E-01	1.76E-03	5.31E-04	2.15E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	3.00E-03	--	--	--	0.00E+00	4.02E-04	--	4.02E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	1.00E-02	--	--	--	0.00E+00	1.34E-03	--	1.34E-03				
Benzo(g,h,i)perylene	ND	3.90E-03	--	--	--	0.00E+00	5.23E-04	--	5.23E-04				
Benzo(k)fluoranthene	ND	4.60E-04	--	--	--	0.00E+00	6.16E-05	--	6.16E-05				
Chrysene	ND	7.60E-03	--	--	--	0.00E+00	1.02E-03	--	1.02E-03				
Dibenz(A,H)Anthracene	ND	9.80E-05	--	--	--	0.00E+00	1.31E-05	--	1.31E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.10E-03	--	--	--	0.00E+00	4.15E-04	--	4.15E-04				
Pyrene	ND	7.00E-03	--	--	--	0.00E+00	9.38E-04	--	9.38E-04				
Total HMW PAHs						0.00E+00	4.71E-03	0.00E+00	4.71E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	2.20E-02	--	--	--	0.00E+00	2.95E-03	--	2.95E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	0.00E+00	3.73E-02	0.00E+00	3.73E-02	0.00E+00	3.98E-05	3.74E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H7-11
Screening-Level Exposure Evaluation - Short-tailed Shrew
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	2.60E+00	Regression ^a	9.66E-02	USEPA (2007)	1.00E+00	2.60E+00	Assumption ^c	5.00E-02	1.30E-01	Baes et al. (1984) ^e
Arsenic	NA	2.64E+01	3.75E-02	9.91E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.44E+00	Sample et al. (1999)	Regression ^f	1.15E-01	Sample et al. (1998b)
Barium	NA	5.39E+02	1.56E-01	8.41E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	4.90E+01	Sample et al. (1998a)	6.83E-04	3.68E-01	Baes et al. (1984) ^e
Beryllium	NA	1.72E+01	Regression ^a	4.73E+00	USEPA (2007)	4.50E-02	7.74E-01	Sample et al. (1998a)	2.25E-03	3.87E-02	Baes et al. (1984) ^e
Cadmium	NA	8.30E+00	Regression ^a	1.97E+00	Bechtel-Jacobs (1998a)	Regression ^d	4.45E+01	Sample et al. (1999)	Regression ^f	7.73E-01	Sample et al. (1998b)
Chromium	NA	5.30E+01	4.10E-02	2.17E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	1.62E+01	Sample et al. (1998a)	Regression ^f	4.28E+00	Sample et al. (1998b)
Cobalt	NA	2.74E+01	7.50E-03	2.06E-01	Bechtel-Jacobs (1998a) ^g	1.22E-01	3.34E+00	Sample et al. (1998a)	Regression ^f	8.69E-01	Sample et al. (1998b)
Copper	NA	8.36E+01	Regression ^a	1.12E+01	Bechtel-Jacobs (1998a)	5.15E-01	4.31E+01	Sample et al. (1998a)	Regression ^f	1.46E+01	Sample et al. (1998b)
Lead	NA	2.38E+02	Regression ^a	5.71E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.66E+01	Sample et al. (1999)	Regression ^f	1.21E+01	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.20E-01	Regression ^a	1.17E-01	Bechtel-Jacobs (1998a)	3.93E+00	4.72E-01	Sample et al. (1998a)	3.81E-01	4.57E-02	LANL (2015)
Nickel	NA	1.25E+03	Regression ^a	2.24E+01	Bechtel-Jacobs (1998a)	7.78E-01	9.72E+02	Sample et al. (1998a)	Regression ^f	2.17E+01	Sample et al. (1998b)
Selenium	NA	3.40E+00	Regression ^a	1.96E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.28E+00	Sample et al. (1998a)	Regression ^f	1.05E+00	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	4.60E+00	4.00E-03	1.84E-02	Baes et al. (1984)	5.41E-02	2.49E-01	USCHPPM (2004)	1.08E-01	4.98E-01	Baes et al. (1984) ^e
Vanadium	NA	3.48E+02	4.85E-03	1.69E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	1.46E+01	Sample et al. (1998a)	1.23E-02	4.28E+00	Sample et al. (1998b) ⁱ
Zinc	NA	8.71E+02	Regression ^a	2.05E+02	Bechtel-Jacobs (1998a)	Regression ^d	7.88E+02	Sample et al. (1998a)	Regression ^f	1.27E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.37E+02	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.41E+02	6.00E-02	1.45E+01	Baes et al. (1984)	1.24E-01	2.99E+01	USCHPPM (2004)	1.60E-02	3.86E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	1.90E+02	Regression ^a	4.31E-05	USEPA (2007a)	1.47E+00	2.79E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	2.50E+02	Regression ^a	2.74E+01	USEPA (2007a)	2.42E+00	6.05E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	3.70E+03	5.00E-01	1.85E+03	USEPA (2007a)	3.04E+00	1.12E+04	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	8.20E+01	Regression ^a	8.85E-05	USEPA (2007a)	9.57E+00	7.85E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	1.20E+01	1.22E+01	1.46E+02	USEPA (2007a)	4.40E+00	5.28E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H8-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	1.30E+03	Regression ^a	7.23E+01	USEPA (2007a)	1.72E+00	2.24E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	2.70E+03	Regression ^a	7.30E+00	USEPA (2007a)	1.59E+00	4.29E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	3.10E+03	Regression ^a	3.23E+02	USEPA (2007a)	1.33E+00	4.12E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	3.00E+03	3.10E-01	9.30E+02	USEPA (2007a)	2.60E+00	7.80E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	2.20E+03	Regression ^a	3.54E+03	USEPA (2007a)	2.94E+00	6.47E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	2.40E+03	Regression ^a	9.29E+01	USEPA (2007a)	2.60E+00	6.24E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Chrysene	5.7	2.80E+03	Regression ^a	7.46E+00	USEPA (2007a)	2.29E+00	6.41E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	7.40E+02	1.30E-01	9.62E+01	USEPA (2007a)	2.31E+00	1.71E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	2.00E+03	1.10E-01	2.20E+02	USEPA (2007a)	2.86E+00	5.72E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	3.20E+03	7.20E-01	2.30E+03	USEPA (2007a)	1.75E+00	5.60E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ⁱ
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ⁱ
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ⁱ
Bis(2-ethylhexyl)phthalate	8.39	1.80E-01	2.38E-02	4.28E-03	USEPA (2007a)	5.44E+01	9.79E+00	USEPA (2007a)	7.79E-01	1.40E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	2.80E+01	1.88E+00	5.26E+01	USEPA (2007a)	6.96E+00	1.95E+02	USEPA (2007a)	5.60E-02	1.57E+00	Calculated ⁱ
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ⁱ
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ⁱ
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H8-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H8-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H8-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2") Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	2.45E+00	Regression ^a	9.14E-02	USEPA (2007)	1.00E+00	2.45E+00	Assumption ^c	5.00E-02	1.23E-01	Baes et al. (1984) ^e
Arsenic	NA	2.95E+01	3.75E-02	1.11E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.63E+00	Sample et al. (1999)	Regression ^f	1.25E-01	Sample et al. (1998b)
Barium	NA	1.23E+03	1.56E-01	1.93E+02	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.12E+02	Sample et al. (1998a)	6.83E-04	8.43E-01	Baes et al. (1984) ^e
Beryllium	NA	1.29E+01	Regression ^a	3.82E+00	USEPA (2007)	4.50E-02	5.79E-01	Sample et al. (1998a)	2.25E-03	2.90E-02	Baes et al. (1984) ^e
Cadmium	NA	8.55E+00	Regression ^a	2.01E+00	Bechtel-Jacobs (1998a)	Regression ^d	4.56E+01	Sample et al. (1999)	Regression ^f	7.84E-01	Sample et al. (1998b)
Chromium	NA	4.73E+01	4.10E-02	1.94E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	1.45E+01	Sample et al. (1998a)	Regression ^f	3.94E+00	Sample et al. (1998b)
Cobalt	NA	1.58E+01	7.50E-03	1.19E-01	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.93E+00	Sample et al. (1998a)	Regression ^f	4.24E-01	Sample et al. (1998b)
Copper	NA	3.93E+01	Regression ^a	8.28E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.02E+01	Sample et al. (1998a)	Regression ^f	1.31E+01	Sample et al. (1998b)
Lead	NA	1.66E+02	Regression ^a	4.66E+00	Bechtel-Jacobs (1998a)	Regression ^d	4.97E+01	Sample et al. (1999)	Regression ^f	1.03E+01	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	6.45E-02	Regression ^a	8.31E-02	Bechtel-Jacobs (1998a)	3.93E+00	2.53E-01	Sample et al. (1998a)	3.81E-01	2.46E-02	LANL (2015)
Nickel	NA	6.81E+02	Regression ^a	1.42E+01	Bechtel-Jacobs (1998a)	7.78E-01	5.29E+02	Sample et al. (1998a)	Regression ^f	1.63E+01	Sample et al. (1998b)
Selenium	NA	2.68E+00	Regression ^a	1.51E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.91E+00	Sample et al. (1998a)	Regression ^f	9.56E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	3.57E+00	4.00E-03	1.43E-02	Baes et al. (1984)	5.41E-02	1.93E-01	USCHPPM (2004)	1.08E-01	3.86E-01	Baes et al. (1984) ^e
Vanadium	NA	1.81E+02	4.85E-03	8.79E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.61E+00	Sample et al. (1998a)	1.23E-02	2.23E+00	Sample et al. (1998b) ⁱ
Zinc	NA	5.89E+02	Regression ^a	1.65E+02	Bechtel-Jacobs (1998a)	Regression ^d	6.93E+02	Sample et al. (1998a)	Regression ^f	1.23E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.28E+02	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.73E+02	6.00E-02	1.64E+01	Baes et al. (1984)	1.24E-01	3.39E+01	USCHPPM (2004)	1.60E-02	4.37E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	7.30E+01	Regression ^a	9.78E-05	USEPA (2007a)	1.47E+00	1.07E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	1.05E+02	Regression ^a	1.39E+01	USEPA (2007a)	2.42E+00	2.54E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	1.45E+03	5.00E-01	7.25E+02	USEPA (2007a)	3.04E+00	4.41E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	3.10E+01	Regression ^a	2.03E-04	USEPA (2007a)	9.57E+00	2.97E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	7.13E+00	1.22E+01	8.69E+01	USEPA (2007a)	4.40E+00	3.14E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H8-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	4.98E+02	Regression ^a	3.99E+01	USEPA (2007a)	1.72E+00	8.56E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	1.01E+03	Regression ^a	4.07E+00	USEPA (2007a)	1.59E+00	1.61E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.15E+03	Regression ^a	1.23E+02	USEPA (2007a)	1.33E+00	1.53E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.27E+03	3.10E-01	3.93E+02	USEPA (2007a)	2.60E+00	3.30E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	8.45E+02	Regression ^a	1.14E+03	USEPA (2007a)	2.94E+00	2.48E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	8.55E+02	Regression ^a	3.83E+01	USEPA (2007a)	2.60E+00	2.22E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Chrysene	5.7	1.00E+03	Regression ^a	4.05E+00	USEPA (2007a)	2.29E+00	2.30E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	2.95E+02	1.30E-01	3.84E+01	USEPA (2007a)	2.31E+00	6.81E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	7.75E+02	1.10E-01	8.53E+01	USEPA (2007a)	2.86E+00	2.22E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	1.27E+03	7.20E-01	9.11E+02	USEPA (2007a)	1.75E+00	2.21E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	4.58E+00	2.38E-02	1.09E-01	USEPA (2007a)	5.44E+01	2.49E+02	USEPA (2007a)	7.79E-01	3.56E+00	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	1.39E+01	1.88E+00	2.61E+01	USEPA (2007a)	6.96E+00	9.67E+01	USEPA (2007a)	5.60E-02	7.79E-01	Calculated ^j
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H8-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H8-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H8-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - North Percolation Pond
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	8.63E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	2.60E+00	NA	5.75E-01	---	1.50E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	2.64E+01	NA	3.73E-01	---	9.85E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	2.34E-01	5.39E+02	NA	2.82E+00	---	1.52E+03	Hamilton et al. (2002)
Beryllium	NA	7.10E-04	1.72E+01	NA	1.67E-01	---	2.87E+00	Hamilton et al. (2002)
Cadmium	NA	3.00E-03	8.30E+00	NA	4.59E-01	---	3.81E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	5.30E+01	NA	8.30E-02	---	4.40E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	1.65E-02	8.36E+01	NA	6.61E-01	---	5.53E+01	Bechtel-Jacobs (1998b) ^c
Lead	NA	7.60E-03	2.38E+02	NA	8.00E-02	---	1.90E+01	Bechtel-Jacobs (1998b) ^c
Manganese		0.00E+00	0.00E+00					
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	5.59E-02	1.25E+03	NA	1.34E-01	---	1.68E+02	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	3.40E+00	NA	3.75E+00	---	1.28E+01	Hamilton et al. (2002)
Silver	NA	0.00E+00	1.00E+00	NA	1.80E-01	---	1.80E-01	Hirsch (1998)
Thallium	NA	0.00E+00	4.60E+00	NA	2.00E-02	---	9.20E-02	Turner et al. (2013)
Vanadium	NA	1.80E-02	3.48E+02	NA	2.50E-01	---	8.70E+01	Hamilton and Buhl (2002)
Zinc	NA	5.37E-01	8.71E+02	NA	8.40E-01	---	7.32E+02	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	7.60E-03	1.37E+02	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	0.00E+00	NA	---	Regression	1.37E+02	Derived based on Aguirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	3.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	3.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	1.90E+02	7.04E-01	4.58E+00	---	8.70E+02	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	1.20E+00	7.54E-01	4.90E+00	---	5.88E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	2.50E+02	6.73E-01	4.37E+00	---	1.09E+03	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	3.70E+03	6.41E-01	4.17E+00	---	1.54E+04	DiToro and McGrath (2000)
Fluorene	4.21	0.00E+00	8.20E+01	6.92E-01	4.50E+00	---	3.69E+02	DiToro and McGrath (2000)

Table H8-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - North Percolation Pond
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Naphthalene	3.36	0.00E+00	1.20E+01	7.45E-01	4.84E+00	---	5.81E+01	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	1.30E+03	6.70E-01	4.36E+00	---	5.66E+03	DiToro and McGrath (2000)
Total LMW PAHs							2.35E+04	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	3.00E-03	2.70E+03	5.56E-01	3.61E+00	---	9.76E+03	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	3.90E-03	3.10E+03	5.86E-01	3.81E+00	---	1.18E+04	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	1.00E-02	3.00E+03	5.78E-01	3.76E+00	---	1.13E+04	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	3.90E-03	2.20E+03	5.66E-01	3.68E+00	---	8.09E+03	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	2.40E+03	5.77E-01	3.75E+00	---	9.00E+03	DiToro and McGrath (2000)
Chrysene	5.71	7.60E-03	2.80E+03	6.07E-01	3.94E+00	---	1.10E+04	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	7.40E+02	5.56E-01	3.61E+00	---	2.67E+03	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	3.10E-03	2.00E+03	5.55E-01	3.61E+00	---	7.22E+03	DiToro and McGrath (2000)
Pyrene	4.92	7.00E-03	3.20E+03	6.50E-01	4.23E+00	---	1.35E+04	DiToro and McGrath (2000)
Total HMW PAHs							8.44E+04	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					

Table H8-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - North Percolation Pond
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lip;id} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H8-3
Screening-Level Exposure Evaluation - American Dipper
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+00	0.00E+00	1.43E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.60E+00	0.00E+00	2.48E-01	0.00E+00	2.48E-01	0.00E+00	8.63E-03	2.57E-01	No TRV	--	No TRV	--
Arsenic	2.64E+01	0.00E+00	1.63E+00	0.00E+00	1.63E+00	0.00E+00	8.76E-02	1.72E+00	2.24E+00	<1	4.51E+00	<1
Barium	5.39E+02	2.34E-01	2.52E+02	0.00E+00	2.52E+02	3.88E-02	1.79E+00	2.54E+02	7.35E+01	3.46E+00	1.31E+02	1.94E+00
Beryllium	1.72E+01	7.10E-04	4.77E-01	0.00E+00	4.77E-01	1.18E-04	5.71E-02	5.34E-01	No TRV	--	No TRV	--
Cadmium	8.30E+00	3.00E-03	6.32E-01	0.00E+00	6.32E-01	4.98E-04	2.75E-02	6.60E-01	1.47E+00	<1	6.35E+00	<1
Chromium	5.30E+01	0.00E+00	7.30E-01	0.00E+00	7.30E-01	0.00E+00	1.76E-01	9.06E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	8.36E+01	1.65E-02	9.17E+00	0.00E+00	9.17E+00	2.74E-03	2.77E-01	9.45E+00	4.05E+00	2.33E+00	3.48E+01	<1
Lead	2.38E+02	7.60E-03	3.16E+00	0.00E+00	3.16E+00	1.26E-03	7.90E-01	3.95E+00	1.63E+00	2.42E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	1.25E+03	5.59E-02	2.78E+01	0.00E+00	2.78E+01	9.28E-03	4.15E+00	3.20E+01	6.71E+00	4.76E+00	1.86E+01	1.72E+00
Selenium	3.40E+00	0.00E+00	2.12E+00	0.00E+00	2.12E+00	0.00E+00	1.13E-02	2.13E+00	2.90E-01	7.33E+00	8.20E-01	2.59E+00
Silver	1.00E+00	0.00E+00	2.99E-02	0.00E+00	2.99E-02	0.00E+00	3.32E-03	3.32E-02	2.02E+00	<1	6.05E+01	<1
Thallium	4.60E+00	0.00E+00	1.53E-02	0.00E+00	1.53E-02	0.00E+00	1.53E-02	3.05E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	3.48E+02	1.80E-02	1.44E+01	0.00E+00	1.44E+01	2.99E-03	1.15E+00	1.56E+01	3.44E-01	4.53E+01	1.70E+00	9.17E+00
Zinc	8.71E+02	5.37E-01	1.21E+02	0.00E+00	1.21E+02	8.91E-02	2.89E+00	1.24E+02	6.61E+01	1.88E+00	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	1.26E-03	4.55E-01	4.56E-01	4.00E-02	1.14E+01	4.00E-01	1.14E+00
Fluoride	0.00E+00	2.24E+01	2.27E+01	0.00E+00	2.27E+01	3.72E+00	0.00E+00	2.65E+01	1.22E+01	2.17E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	1.90E+02	0.00E+00	1.44E+02	0.00E+00	1.44E+02	0.00E+00	6.31E-01	1.45E+02				
Acenaphthylene	1.20E+00	0.00E+00	9.76E-01	0.00E+00	9.76E-01	0.00E+00	3.98E-03	9.80E-01				
Anthracene	2.50E+02	0.00E+00	1.81E+02	0.00E+00	1.81E+02	0.00E+00	8.30E-01	1.82E+02				
Fluoranthene	3.70E+03	0.00E+00	2.56E+03	0.00E+00	2.56E+03	0.00E+00	1.23E+01	2.57E+03				
Fluorene	8.20E+01	0.00E+00	6.12E+01	0.00E+00	6.12E+01	0.00E+00	2.72E-01	6.15E+01				
Naphthalene	1.20E+01	0.00E+00	9.65E+00	0.00E+00	9.65E+00	0.00E+00	3.98E-02	9.69E+00				
Phenanthrene	1.30E+03	0.00E+00	9.40E+02	0.00E+00	9.40E+02	0.00E+00	4.31E+00	9.44E+02				
Total LMW PAHs					3.90E+03	0.00E+00	1.84E+01	3.91E+03	1.61E+01	2.43E+02	1.61E+02	2.43E+01
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.70E+03	3.00E-03	1.62E+03	0.00E+00	1.62E+03	4.98E-04	8.96E+00	1.63E+03				
Benzo[A]Pyrene	3.10E+03	3.90E-03	1.96E+03	0.00E+00	1.96E+03	6.47E-04	1.03E+01	1.97E+03				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	1.87E+03	0.00E+00	1.87E+03	1.66E-03	9.96E+00	1.88E+03				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	1.34E+03	0.00E+00	1.34E+03	6.47E-04	7.30E+00	1.35E+03				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	1.49E+03	0.00E+00	1.49E+03	0.00E+00	7.96E+00	1.50E+03				
Chrysene	2.80E+03	7.60E-03	1.83E+03	0.00E+00	1.83E+03	1.26E-03	9.29E+00	1.84E+03				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	4.44E+02	0.00E+00	4.44E+02	0.00E+00	2.46E+00	4.46E+02				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	1.20E+03	0.00E+00	1.20E+03	5.14E-04	6.64E+00	1.20E+03				
Pyrene	3.20E+03	7.00E-03	2.24E+03	0.00E+00	2.24E+03	1.16E-03	1.06E+01	2.25E+03				
Total HMW PAHs					1.40E+04	6.39E-03	7.35E+01	1.41E+04	2.00E+00	7.04E+03	2.00E+01	7.04E+02
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H8-3
Screening-Level Exposure Evaluation - American Dipper
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-4
Screening-Level Exposure Evaluation - American Woodcock
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E+00	0.00E+00	1.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.60E+00	0.00E+00	1.14E-03	2.75E-01	0.00E+00	2.76E-01	0.00E+00	2.29E-02	2.99E-01	No TRV	--	No TRV	--
Arsenic	2.64E+01	0.00E+00	1.16E-02	2.57E-01	0.00E+00	2.69E-01	0.00E+00	2.33E-01	5.02E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.39E+02	2.34E-01	9.88E-01	5.19E+00	0.00E+00	6.17E+00	2.75E-02	4.75E+00	1.10E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	1.72E+01	7.10E-04	5.55E-02	8.18E-02	0.00E+00	1.37E-01	8.34E-05	1.52E-01	2.89E-01	No TRV	--	No TRV	--
Cadmium	8.30E+00	3.00E-03	2.32E-02	4.71E+00	0.00E+00	4.73E+00	3.52E-04	7.31E-02	4.81E+00	1.47E+00	3.27E+00	6.35E+00	<1
Chromium	5.30E+01	0.00E+00	2.55E-02	1.71E+00	0.00E+00	1.74E+00	0.00E+00	4.67E-01	2.21E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	2.74E+01	0.00E+00	2.41E-03	3.53E-01	0.00E+00	3.56E-01	0.00E+00	2.41E-01	5.97E-01	7.61E+00	<1	2.02E+01	<1
Copper	8.36E+01	1.65E-02	1.31E-01	4.55E+00	0.00E+00	4.68E+00	1.94E-03	7.37E-01	5.42E+00	4.05E+00	1.34E+00	3.48E+01	<1
Lead	2.38E+02	7.60E-03	6.71E-02	7.04E+00	0.00E+00	7.10E+00	8.93E-04	2.10E+00	9.20E+00	1.63E+00	5.65E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	1.20E-01	0.00E+00	1.37E-03	4.99E-02	0.00E+00	5.12E-02	0.00E+00	1.06E-03	5.23E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.25E+03	5.59E-02	2.64E-01	1.03E+02	0.00E+00	1.03E+02	6.57E-03	1.10E+01	1.14E+02	6.71E+00	1.70E+01	1.86E+01	6.13E+00
Selenium	3.40E+00	0.00E+00	2.31E-02	2.41E-01	0.00E+00	2.64E-01	0.00E+00	3.00E-02	2.94E-01	2.90E-01	1.01E+00	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	4.60E+00	0.00E+00	2.16E-04	2.63E-02	0.00E+00	2.65E-02	0.00E+00	4.05E-02	6.71E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	3.48E+02	1.80E-02	1.98E-02	1.55E+00	0.00E+00	1.57E+00	2.11E-03	3.07E+00	4.63E+00	3.44E-01	1.35E+01	1.70E+00	2.73E+00
Zinc	8.71E+02	5.37E-01	2.41E+00	8.33E+01	0.00E+00	8.57E+01	6.31E-02	7.67E+00	9.35E+01	6.61E+01	1.41E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E-04	1.21E+00	1.21E+00	4.00E-02	3.02E+01	4.00E-01	3.02E+00
Fluoride	2.41E+02	2.24E+01	1.70E-01	3.16E+00	0.00E+00	3.33E+00	2.63E+00	2.12E+00	8.08E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.90E+02	0.00E+00	5.07E-07	2.95E+01	0.00E+00	2.95E+01	0.00E+00	1.67E+00	3.12E+01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.50E+02	0.00E+00	3.21E-01	6.40E+01	0.00E+00	6.43E+01	0.00E+00	2.20E+00	6.65E+01				
Fluoranthene	3.70E+03	0.00E+00	2.17E+01	1.19E+03	0.00E+00	1.21E+03	0.00E+00	3.26E+01	1.24E+03				
Fluorene	8.20E+01	0.00E+00	1.04E-06	8.30E+01	0.00E+00	8.30E+01	0.00E+00	7.23E-01	8.37E+01				
Naphthalene	1.20E+01	0.00E+00	1.72E+00	5.58E+00	0.00E+00	7.30E+00	0.00E+00	1.06E-01	7.41E+00				
Phenanthrene	1.30E+03	0.00E+00	8.50E-01	2.36E+02	0.00E+00	2.37E+02	0.00E+00	1.15E+01	2.49E+02				
Total LMW PAHs						1.63E+03	0.00E+00	4.88E+01	1.68E+03	1.61E+01	1.04E+02	1.61E+02	1.04E+01
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.70E+03	3.00E-03	8.58E-02	4.54E+02	0.00E+00	4.54E+02	3.52E-04	2.38E+01	4.78E+02				
Benzo[A]Pyrene	3.10E+03	3.90E-03	3.79E+00	4.36E+02	0.00E+00	4.40E+02	4.58E-04	2.73E+01	4.67E+02				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	1.09E+01	8.25E+02	0.00E+00	8.36E+02	1.17E-03	2.64E+01	8.62E+02				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	4.16E+01	6.84E+02	0.00E+00	7.25E+02	4.58E-04	1.94E+01	7.45E+02				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	1.09E+00	6.60E+02	0.00E+00	6.61E+02	0.00E+00	2.11E+01	6.82E+02				
Chrysene	2.80E+03	7.60E-03	8.77E-02	6.78E+02	0.00E+00	6.78E+02	8.93E-04	2.47E+01	7.03E+02				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	1.13E+00	1.81E+02	0.00E+00	1.82E+02	0.00E+00	6.52E+00	1.88E+02				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	2.58E+00	6.05E+02	0.00E+00	6.07E+02	3.64E-04	1.76E+01	6.25E+02				
Pyrene	3.20E+03	7.00E-03	2.71E+01	5.92E+02	0.00E+00	6.19E+02	8.22E-04	2.82E+01	6.47E+02				
Total HMW PAHs						5.20E+03	4.52E-03	1.95E+02	5.40E+03	2.00E+00	2.70E+03	2.00E+01	2.70E+02
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	5.03E-05	1.04E+00	0.00E+00	1.04E+00	0.00E+00	1.59E-03	1.04E+00	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	2.80E+01	0.00E+00	6.18E-01	2.06E+01	0.00E+00	2.12E+01	0.00E+00	2.47E-01	2.15E+01	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H8-4
Screening-Level Exposure Evaluation - American Woodcock
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-5
Screening-Level Exposure Evaluation - Belted Kingfisher
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	1.36E+00	0.00E+00	1.36E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.60E+00	0.00E+00	2.36E-02	0.00E+00	2.36E-02	0.00E+00	0.00E+00	2.36E-02	No TRV	--	No TRV	--
Arsenic	2.64E+01	0.00E+00	1.55E-01	0.00E+00	1.55E-01	0.00E+00	0.00E+00	1.55E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.39E+02	2.34E-01	2.40E+01	0.00E+00	2.40E+01	3.69E-02	0.00E+00	2.40E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	1.72E+01	7.10E-04	4.53E-02	0.00E+00	4.53E-02	1.12E-04	0.00E+00	4.54E-02	No TRV	--	No TRV	--
Cadmium	8.30E+00	3.00E-03	6.00E-02	0.00E+00	6.00E-02	4.73E-04	0.00E+00	6.05E-02	1.47E+00	<1	6.35E+00	<1
Chromium	5.30E+01	0.00E+00	6.93E-02	0.00E+00	6.93E-02	0.00E+00	0.00E+00	6.93E-02	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	8.36E+01	1.65E-02	8.71E-01	0.00E+00	8.71E-01	2.60E-03	0.00E+00	8.73E-01	4.05E+00	<1	3.48E+01	<1
Lead	2.38E+02	7.60E-03	3.00E-01	0.00E+00	3.00E-01	1.20E-03	0.00E+00	3.01E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	1.25E+03	5.59E-02	2.64E+00	0.00E+00	2.64E+00	8.81E-03	0.00E+00	2.65E+00	6.71E+00	<1	1.86E+01	<1
Selenium	3.40E+00	0.00E+00	2.01E-01	0.00E+00	2.01E-01	0.00E+00	0.00E+00	2.01E-01	2.90E-01	<1	8.20E-01	<1
Silver	1.00E+00	0.00E+00	2.84E-03	0.00E+00	2.84E-03	0.00E+00	0.00E+00	2.84E-03	2.02E+00	<1	6.05E+01	<1
Thallium	4.60E+00	0.00E+00	1.45E-03	0.00E+00	1.45E-03	0.00E+00	0.00E+00	1.45E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	3.48E+02	1.80E-02	1.37E+00	0.00E+00	1.37E+00	2.84E-03	0.00E+00	1.37E+00	3.44E-01	3.99E+00	1.70E+00	<1
Zinc	8.71E+02	5.37E-01	1.15E+01	0.00E+00	1.15E+01	8.46E-02	0.00E+00	1.16E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	1.20E-03	0.00E+00	1.20E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	2.24E+01	2.16E+00	0.00E+00	2.16E+00	3.53E+00	0.00E+00	5.69E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	1.90E+02	0.00E+00	1.37E+01	0.00E+00	1.37E+01	0.00E+00	0.00E+00	1.37E+01				
Acenaphthylene	1.20E+00	0.00E+00	9.27E-02	0.00E+00	9.27E-02	0.00E+00	0.00E+00	9.27E-02				
Anthracene	2.50E+02	0.00E+00	1.72E+01	0.00E+00	1.72E+01	0.00E+00	0.00E+00	1.72E+01				
Fluoranthene	3.70E+03	0.00E+00	2.43E+02	0.00E+00	2.43E+02	0.00E+00	0.00E+00	2.43E+02				
Fluorene	8.20E+01	0.00E+00	5.81E+00	0.00E+00	5.81E+00	0.00E+00	0.00E+00	5.81E+00				
Naphthalene	1.20E+01	0.00E+00	9.16E-01	0.00E+00	9.16E-01	0.00E+00	0.00E+00	9.16E-01				
Phenanthrene	1.30E+03	0.00E+00	8.93E+01	0.00E+00	8.93E+01	0.00E+00	0.00E+00	8.93E+01				
Total LMW PAHs					3.70E+02	0.00E+00	0.00E+00	3.70E+02	1.61E+01	2.30E+01	1.61E+02	2.30E+00
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.70E+03	3.00E-03	1.54E+02	0.00E+00	1.54E+02	4.73E-04	0.00E+00	1.54E+02				
Benzo[A]Pyrene	3.10E+03	3.90E-03	1.86E+02	0.00E+00	1.86E+02	6.15E-04	0.00E+00	1.86E+02				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	1.78E+02	0.00E+00	1.78E+02	1.58E-03	0.00E+00	1.78E+02				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	1.27E+02	0.00E+00	1.27E+02	6.15E-04	0.00E+00	1.27E+02				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	1.42E+02	0.00E+00	1.42E+02	0.00E+00	0.00E+00	1.42E+02				
Chrysene	2.80E+03	7.60E-03	1.74E+02	0.00E+00	1.74E+02	1.20E-03	0.00E+00	1.74E+02				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	4.21E+01	0.00E+00	4.21E+01	0.00E+00	0.00E+00	4.21E+01				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	1.14E+02	0.00E+00	1.14E+02	4.89E-04	0.00E+00	1.14E+02				
Pyrene	3.20E+03	7.00E-03	2.13E+02	0.00E+00	2.13E+02	1.10E-03	0.00E+00	2.13E+02				
Total HMW PAHs					1.33E+03	6.07E-03	0.00E+00	1.33E+03	2.00E+00	6.65E+02	2.00E+01	6.65E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H8-5
Screening-Level Exposure Evaluation - Belted Kingfisher
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-6
Screening-Level Exposure Evaluation - Mourning Dove
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-01	0.00E+00	9.85E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.60E+00	0.00E+00	1.10E-02	0.00E+00	0.00E+00	1.10E-02	0.00E+00	2.02E-02	3.12E-02	No TRV	--	No TRV	--
Arsenic	2.64E+01	0.00E+00	1.13E-01	0.00E+00	0.00E+00	1.13E-01	0.00E+00	2.05E-01	3.18E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.39E+02	2.34E-01	9.60E+00	0.00E+00	0.00E+00	9.60E+00	2.67E-02	4.18E+00	1.38E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	1.72E+01	7.10E-04	5.40E-01	0.00E+00	0.00E+00	5.40E-01	8.10E-05	1.33E-01	6.73E-01	No TRV	--	No TRV	--
Cadmium	8.30E+00	3.00E-03	2.25E-01	0.00E+00	0.00E+00	2.25E-01	3.42E-04	6.44E-02	2.90E-01	1.47E+00	<1	6.35E+00	<1
Chromium	5.30E+01	0.00E+00	2.48E-01	0.00E+00	0.00E+00	2.48E-01	0.00E+00	4.11E-01	6.59E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	2.74E+01	0.00E+00	2.35E-02	0.00E+00	0.00E+00	2.35E-02	0.00E+00	2.13E-01	2.36E-01	7.61E+00	<1	2.02E+01	<1
Copper	8.36E+01	1.65E-02	1.27E+00	0.00E+00	0.00E+00	1.27E+00	1.88E-03	6.49E-01	1.92E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.38E+02	7.60E-03	6.52E-01	0.00E+00	0.00E+00	6.52E-01	8.67E-04	1.85E+00	2.50E+00	1.63E+00	1.53E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	1.20E-01	0.00E+00	1.33E-02	0.00E+00	0.00E+00	1.33E-02	0.00E+00	9.31E-04	1.42E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.25E+03	5.59E-02	2.56E+00	0.00E+00	0.00E+00	2.56E+00	6.38E-03	9.70E+00	1.23E+01	6.71E+00	1.83E+00	1.86E+01	<1
Selenium	3.40E+00	0.00E+00	2.24E-01	0.00E+00	0.00E+00	2.24E-01	0.00E+00	2.64E-02	2.50E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	4.60E+00	0.00E+00	2.10E-03	0.00E+00	0.00E+00	2.10E-03	0.00E+00	3.57E-02	3.78E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	3.48E+02	1.80E-02	1.93E-01	0.00E+00	0.00E+00	1.93E-01	2.05E-03	2.70E+00	2.90E+00	3.44E-01	8.42E+00	1.70E+00	1.70E+00
Zinc	8.71E+02	5.37E-01	2.35E+01	0.00E+00	0.00E+00	2.35E+01	6.13E-02	6.76E+00	3.03E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.67E-04	1.06E+00	1.06E+00	4.00E-02	2.66E+01	4.00E-01	2.66E+00
Fluoride	2.41E+02	2.24E+01	1.65E+00	0.00E+00	0.00E+00	1.65E+00	2.56E+00	1.87E+00	6.08E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.90E+02	0.00E+00	4.92E-06	0.00E+00	0.00E+00	4.92E-06	0.00E+00	1.47E+00	1.47E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.50E+02	0.00E+00	3.12E+00	0.00E+00	0.00E+00	3.12E+00	0.00E+00	1.94E+00	5.06E+00				
Fluoranthene	3.70E+03	0.00E+00	2.11E+02	0.00E+00	0.00E+00	2.11E+02	0.00E+00	2.87E+01	2.40E+02				
Fluorene	8.20E+01	0.00E+00	1.01E-05	0.00E+00	0.00E+00	1.01E-05	0.00E+00	6.36E-01	6.36E-01				
Naphthalene	1.20E+01	0.00E+00	1.67E+01	0.00E+00	0.00E+00	1.67E+01	0.00E+00	9.31E-02	1.68E+01				
Phenanthrene	1.30E+03	0.00E+00	8.25E+00	0.00E+00	0.00E+00	8.25E+00	0.00E+00	1.01E+01	1.83E+01				
Total LMW PAHs						2.39E+02	0.00E+00	4.30E+01	2.82E+02	1.61E+01	1.75E+01	1.61E+02	1.75E+00
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.70E+03	3.00E-03	8.34E-01	0.00E+00	0.00E+00	8.34E-01	3.42E-04	2.10E+01	2.18E+01				
Benzo[A]Pyrene	3.10E+03	3.90E-03	3.68E+01	0.00E+00	0.00E+00	3.68E+01	4.45E-04	2.41E+01	6.09E+01				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	1.06E+02	0.00E+00	0.00E+00	1.06E+02	1.14E-03	2.33E+01	1.29E+02				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	4.04E+02	0.00E+00	0.00E+00	4.04E+02	4.45E-04	1.71E+01	4.21E+02				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	1.06E+01	0.00E+00	0.00E+00	1.06E+01	0.00E+00	1.86E+01	2.92E+01				
Chrysene	2.80E+03	7.60E-03	8.52E-01	0.00E+00	0.00E+00	8.52E-01	8.67E-04	2.17E+01	2.26E+01				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	1.10E+01	0.00E+00	0.00E+00	1.10E+01	0.00E+00	5.74E+00	1.67E+01				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	2.51E+01	0.00E+00	0.00E+00	2.51E+01	3.54E-04	1.55E+01	4.06E+01				
Pyrene	3.20E+03	7.00E-03	2.63E+02	0.00E+00	0.00E+00	2.63E+02	7.99E-04	2.48E+01	2.88E+02				
Total HMW PAHs						8.59E+02	4.39E-03	1.72E+02	1.03E+03	2.00E+00	5.15E+02	2.00E+01	5.15E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	4.89E-04	0.00E+00	0.00E+00	4.89E-04	0.00E+00	1.40E-03	1.89E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	2.80E+01	0.00E+00	6.01E+00	0.00E+00	0.00E+00	6.01E+00	0.00E+00	2.17E-01	6.22E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H8-6
Screening-Level Exposure Evaluation - Mourning Dove
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-01	0.00E+00	7.08E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.60E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-02	1.07E-02	0.00E+00	5.54E-03	1.62E-02	No TRV	--	No TRV	--
Arsenic	2.64E+01	0.00E+00	0.00E+00	0.00E+00	9.39E-03	9.39E-03	0.00E+00	5.63E-02	6.57E-02	2.24E+00	<1	4.51E+00	<1
Barium	5.39E+02	2.34E-01	0.00E+00	0.00E+00	3.02E-02	3.02E-02	1.92E-02	1.15E+00	1.20E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	1.72E+01	7.10E-04	0.00E+00	0.00E+00	3.17E-03	3.17E-03	5.82E-05	3.67E-02	3.99E-02	No TRV	--	No TRV	--
Cadmium	8.30E+00	3.00E-03	0.00E+00	0.00E+00	6.34E-02	6.34E-02	2.46E-04	1.77E-02	8.13E-02	1.47E+00	<1	6.35E+00	<1
Chromium	5.30E+01	0.00E+00	0.00E+00	0.00E+00	3.51E-01	3.51E-01	0.00E+00	1.13E-01	4.64E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	2.74E+01	0.00E+00	0.00E+00	0.00E+00	7.13E-02	7.13E-02	0.00E+00	5.84E-02	1.30E-01	7.61E+00	<1	2.02E+01	<1
Copper	8.36E+01	1.65E-02	0.00E+00	0.00E+00	1.20E+00	1.20E+00	1.35E-03	1.78E-01	1.38E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.38E+02	7.60E-03	0.00E+00	0.00E+00	9.95E-01	9.95E-01	6.23E-04	5.07E-01	1.50E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	1.20E-01	0.00E+00	0.00E+00	0.00E+00	3.75E-03	3.75E-03	0.00E+00	2.56E-04	4.01E-03	4.50E-01	<1	9.10E-01	<1
Nickel	1.25E+03	5.59E-02	0.00E+00	0.00E+00	1.78E+00	1.78E+00	4.58E-03	2.67E+00	4.45E+00	6.71E+00	<1	1.86E+01	<1
Selenium	3.40E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-02	8.58E-02	0.00E+00	7.25E-03	9.30E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	4.60E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-02	4.08E-02	0.00E+00	9.81E-03	5.06E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	3.48E+02	1.80E-02	0.00E+00	0.00E+00	3.51E-01	3.51E-01	1.48E-03	7.42E-01	1.09E+00	3.44E-01	3.18E+00	1.70E+00	<1
Zinc	8.71E+02	5.37E-01	0.00E+00	0.00E+00	1.04E+01	1.04E+01	4.40E-02	1.86E+00	1.23E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	2.92E-01	2.93E-01	4.00E-02	7.32E+00	4.00E-01	<1
Fluoride	2.41E+02	2.24E+01	0.00E+00	0.00E+00	3.16E-01	3.16E-01	1.84E+00	5.14E-01	2.67E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.90E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E-01	4.05E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.50E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.33E-01	5.33E-01				
Fluoranthene	3.70E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.89E+00	7.89E+00				
Fluorene	8.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-01	1.75E-01				
Naphthalene	1.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-02	2.56E-02				
Phenanthrene	1.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E+00	2.77E+00				
Total LMW PAHs						0.00E+00	0.00E+00	1.18E+01	1.18E+01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.70E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	5.76E+00	5.76E+00				
Benzo[A]Pyrene	3.10E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	6.61E+00	6.61E+00				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-04	6.40E+00	6.40E+00				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	4.69E+00	4.69E+00				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E+00	5.12E+00				
Chrysene	2.80E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	5.97E+00	5.97E+00				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E+00	1.58E+00				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-04	4.26E+00	4.26E+00				
Pyrene	3.20E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-04	6.82E+00	6.82E+00				
Total HMW PAHs						0.00E+00	3.16E-03	4.72E+01	4.72E+01	2.00E+00	2.36E+01	2.00E+01	2.36E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	0.00E+00	0.00E+00	1.15E-02	1.15E-02	0.00E+00	3.84E-04	1.19E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	2.80E+01	0.00E+00	0.00E+00	0.00E+00	1.29E-01	1.29E-01	0.00E+00	5.97E-02	1.88E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H8-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+00	0.00E+00	1.37E+00	1.10E+02	<1	1.10E+03	<1
Antimony	2.60E+00	0.00E+00	0.00E+00	4.12E-01	0.00E+00	4.12E-01	0.00E+00	0.00E+00	4.12E-01	No TRV	--	No TRV	--
Arsenic	2.64E+01	0.00E+00	0.00E+00	3.86E-01	0.00E+00	3.86E-01	0.00E+00	0.00E+00	3.86E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.39E+02	2.34E-01	0.00E+00	7.77E+00	0.00E+00	7.77E+00	3.70E-02	0.00E+00	7.80E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	1.72E+01	7.10E-04	0.00E+00	1.23E-01	0.00E+00	1.23E-01	1.12E-04	0.00E+00	1.23E-01	No TRV	--	No TRV	--
Cadmium	8.30E+00	3.00E-03	0.00E+00	7.05E+00	0.00E+00	7.05E+00	4.75E-04	0.00E+00	7.05E+00	1.47E+00	4.80E+00	6.35E+00	1.11E+00
Chromium	5.30E+01	0.00E+00	0.00E+00	2.57E+00	0.00E+00	2.57E+00	0.00E+00	0.00E+00	2.57E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	2.74E+01	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	0.00E+00	0.00E+00	5.29E-01	7.61E+00	<1	2.02E+01	<1
Copper	8.36E+01	1.65E-02	0.00E+00	6.82E+00	0.00E+00	6.82E+00	2.61E-03	0.00E+00	6.82E+00	4.05E+00	1.68E+00	3.48E+01	<1
Lead	2.38E+02	7.60E-03	0.00E+00	1.05E+01	0.00E+00	1.05E+01	1.20E-03	0.00E+00	1.05E+01	1.63E+00	6.47E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	1.20E-01	0.00E+00	0.00E+00	7.47E-02	0.00E+00	7.47E-02	0.00E+00	0.00E+00	7.47E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.25E+03	5.59E-02	0.00E+00	1.54E+02	0.00E+00	1.54E+02	8.85E-03	0.00E+00	1.54E+02	6.71E+00	2.29E+01	1.86E+01	8.28E+00
Selenium	3.40E+00	0.00E+00	0.00E+00	3.60E-01	0.00E+00	3.60E-01	0.00E+00	0.00E+00	3.60E-01	2.90E-01	1.24E+00	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	4.60E+00	0.00E+00	0.00E+00	3.94E-02	0.00E+00	3.94E-02	0.00E+00	0.00E+00	3.94E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	3.48E+02	1.80E-02	0.00E+00	2.31E+00	0.00E+00	2.31E+00	2.85E-03	0.00E+00	2.32E+00	3.44E-01	6.74E+00	1.70E+00	1.36E+00
Zinc	8.71E+02	5.37E-01	0.00E+00	1.25E+02	0.00E+00	1.25E+02	8.50E-02	0.00E+00	1.25E+02	6.61E+01	1.89E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-03	0.00E+00	1.20E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	2.41E+02	2.24E+01	0.00E+00	4.73E+00	0.00E+00	4.73E+00	3.55E+00	0.00E+00	8.28E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.90E+02	0.00E+00	0.00E+00	4.42E+01	0.00E+00	4.42E+01	0.00E+00	0.00E+00	4.42E+01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.50E+02	0.00E+00	0.00E+00	9.58E+01	0.00E+00	9.58E+01	0.00E+00	0.00E+00	9.58E+01				
Fluoranthene	3.70E+03	0.00E+00	0.00E+00	1.78E+03	0.00E+00	1.78E+03	0.00E+00	0.00E+00	1.78E+03				
Fluorene	8.20E+01	0.00E+00	0.00E+00	1.24E+02	0.00E+00	1.24E+02	0.00E+00	0.00E+00	1.24E+02				
Naphthalene	1.20E+01	0.00E+00	0.00E+00	8.36E+00	0.00E+00	8.36E+00	0.00E+00	0.00E+00	8.36E+00				
Phenanthrene	1.30E+03	0.00E+00	0.00E+00	3.54E+02	0.00E+00	3.54E+02	0.00E+00	0.00E+00	3.54E+02				
Total LMW PAHs						2.41E+03	0.00E+00	0.00E+00	2.41E+03	1.61E+01	1.50E+02	1.61E+02	1.50E+01
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.70E+03	3.00E-03	0.00E+00	6.80E+02	0.00E+00	6.80E+02	4.75E-04	0.00E+00	6.80E+02				
Benzo[A]Pyrene	3.10E+03	3.90E-03	0.00E+00	6.53E+02	0.00E+00	6.53E+02	6.17E-04	0.00E+00	6.53E+02				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	0.00E+00	1.23E+03	0.00E+00	1.23E+03	1.58E-03	0.00E+00	1.23E+03				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	0.00E+00	1.02E+03	0.00E+00	1.02E+03	6.17E-04	0.00E+00	1.02E+03				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	0.00E+00	9.88E+02	0.00E+00	9.88E+02	0.00E+00	0.00E+00	9.88E+02				
Chrysene	2.80E+03	7.60E-03	0.00E+00	1.02E+03	0.00E+00	1.02E+03	1.20E-03	0.00E+00	1.02E+03				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	0.00E+00	2.71E+02	0.00E+00	2.71E+02	0.00E+00	0.00E+00	2.71E+02				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	0.00E+00	9.06E+02	0.00E+00	9.06E+02	4.91E-04	0.00E+00	9.06E+02				
Pyrene	3.20E+03	7.00E-03	0.00E+00	8.87E+02	0.00E+00	8.87E+02	1.11E-03	0.00E+00	8.87E+02				
Total HMW PAHs						7.66E+03	6.10E-03	0.00E+00	7.66E+03	2.00E+00	3.83E+03	2.00E+01	3.83E+02
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	0.00E+00	1.55E+00	0.00E+00	1.55E+00	0.00E+00	0.00E+00	1.55E+00	1.10E+00	1.41E+00	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	2.80E+01	0.00E+00	0.00E+00	3.08E+01	0.00E+00	3.08E+01	0.00E+00	0.00E+00	3.08E+01	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H8-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-9
Screening-Level Exposure Evaluation - Canada Lynx
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-01	0.00E+00	2.70E-01	No TRV	--	No TRV	--
Antimony	2.60E+00	0.00E+00	0.00E+00	0.00E+00	4.06E-03	4.06E-03	0.00E+00	2.27E-03	6.34E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.64E+01	0.00E+00	0.00E+00	0.00E+00	3.58E-03	3.58E-03	0.00E+00	2.31E-02	2.67E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.39E+02	2.34E-01	0.00E+00	0.00E+00	1.15E-02	1.15E-02	7.31E-03	4.72E-01	4.90E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	1.72E+01	7.10E-04	0.00E+00	0.00E+00	1.21E-03	1.21E-03	2.22E-05	1.50E-02	1.63E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	8.30E+00	3.00E-03	0.00E+00	0.00E+00	2.41E-02	2.41E-02	9.37E-05	7.26E-03	3.15E-02	7.70E-01	<1	6.87E+00	<1
Chromium	5.30E+01	0.00E+00	0.00E+00	0.00E+00	1.34E-01	1.34E-01	0.00E+00	4.64E-02	1.80E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	2.74E+01	0.00E+00	0.00E+00	0.00E+00	2.72E-02	2.72E-02	0.00E+00	2.40E-02	5.11E-02	7.33E+00	<1	1.89E+01	<1
Copper	8.36E+01	1.65E-02	0.00E+00	0.00E+00	4.56E-01	4.56E-01	5.16E-04	7.31E-02	5.30E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.38E+02	7.60E-03	0.00E+00	0.00E+00	3.79E-01	3.79E-01	2.37E-04	2.08E-01	5.88E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	1.20E-01	0.00E+00	0.00E+00	0.00E+00	1.43E-03	1.43E-03	0.00E+00	1.05E-04	1.53E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.25E+03	5.59E-02	0.00E+00	0.00E+00	6.77E-01	6.77E-01	1.75E-03	1.09E+00	1.77E+00	1.70E+00	1.04E+00	1.48E+01	<1
Selenium	3.40E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-02	3.27E-02	0.00E+00	2.97E-03	3.57E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	4.60E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-02	1.56E-02	0.00E+00	4.02E-03	1.96E-02	4.80E-01	<1	1.43E+00	<1
Vanadium	3.48E+02	1.80E-02	0.00E+00	0.00E+00	1.34E-01	1.34E-01	5.62E-04	3.04E-01	4.39E-01	4.16E+00	<1	9.44E+00	<1
Zinc	8.71E+02	5.37E-01	0.00E+00	0.00E+00	3.96E+00	3.96E+00	1.68E-02	7.62E-01	4.73E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	1.20E-01	1.20E-01	6.87E+01	<1	6.87E+02	<1
Fluoride	2.41E+02	2.24E+01	0.00E+00	0.00E+00	1.20E-01	1.20E-01	7.00E-01	2.11E-01	1.03E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.90E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-01	1.66E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.50E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-01	2.19E-01				
Fluoranthene	3.70E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E+00	3.24E+00				
Fluorene	8.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.17E-02	7.17E-02				
Naphthalene	1.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-02	1.05E-02				
Phenanthrene	1.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E+00	1.14E+00				
Total LMW PAHs						0.00E+00	0.00E+00	4.84E+00	4.84E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.70E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	2.36E+00	2.36E+00				
Benzo[A]Pyrene	3.10E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	2.71E+00	2.71E+00				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-04	2.62E+00	2.62E+00				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	1.92E+00	1.92E+00				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E+00	2.10E+00				
Chrysene	2.80E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	2.45E+00	2.45E+00				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.47E-01	6.47E-01				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	1.75E+00	1.75E+00				
Pyrene	3.20E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-04	2.80E+00	2.80E+00				
Total HMW PAHs						0.00E+00	1.20E-03	1.94E+01	1.94E+01	6.15E-01	3.15E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	0.00E+00	0.00E+00	4.38E-03	4.38E-03	0.00E+00	1.57E-04	4.54E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	2.80E+01	0.00E+00	0.00E+00	0.00E+00	4.90E-02	4.90E-02	0.00E+00	2.45E-02	7.35E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-9
Screening-Level Exposure Evaluation - Canada Lynx
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-10
Screening-Level Exposure Evaluation - Grizzly Bear
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-01	0.00E+00	1.86E-01	No TRV	--	No TRV	--
Antimony	2.60E+00	0.00E+00	1.36E-03	8.42E-03	2.81E-04	0.00E+00	1.01E-02	0.00E+00	1.57E-03	1.01E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.64E+01	0.00E+00	1.39E-02	7.89E-03	2.47E-04	0.00E+00	2.20E-02	0.00E+00	1.60E-02	2.20E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.39E+02	2.34E-01	1.18E+00	1.59E-01	7.94E-04	0.00E+00	1.34E+00	5.05E-03	3.26E-01	1.35E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	1.72E+01	7.10E-04	6.64E-02	2.51E-03	8.36E-05	0.00E+00	6.90E-02	1.53E-05	1.04E-02	6.90E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	8.30E+00	3.00E-03	2.77E-02	1.44E-01	1.67E-03	0.00E+00	1.74E-01	6.48E-05	5.02E-03	1.74E-01	7.70E-01	<1	6.87E+00	<1
Chromium	5.30E+01	0.00E+00	3.05E-02	5.25E-02	9.24E-03	0.00E+00	9.23E-02	0.00E+00	3.20E-02	9.23E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	2.74E+01	0.00E+00	2.88E-03	1.08E-02	1.88E-03	0.00E+00	1.56E-02	0.00E+00	1.66E-02	1.56E-02	7.33E+00	<1	1.89E+01	<1
Copper	8.36E+01	1.65E-02	1.57E-01	1.39E-01	3.15E-02	0.00E+00	3.28E-01	3.56E-04	5.06E-02	3.28E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.38E+02	7.60E-03	8.01E-02	2.16E-01	2.62E-02	0.00E+00	3.22E-01	1.64E-04	1.44E-01	3.22E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	1.20E-01	0.00E+00	1.64E-03	1.53E-03	9.87E-05	0.00E+00	3.26E-03	0.00E+00	7.26E-05	3.26E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.25E+03	5.59E-02	3.15E-01	3.15E+00	4.68E-02	0.00E+00	3.51E+00	1.21E-03	7.56E-01	3.51E+00	1.70E+00	2.07E+00	1.48E+01	<1
Selenium	3.40E+00	0.00E+00	2.75E-02	7.37E-03	2.26E-03	0.00E+00	3.72E-02	0.00E+00	2.06E-03	3.72E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	4.60E+00	0.00E+00	2.58E-04	8.06E-04	1.07E-03	0.00E+00	2.14E-03	0.00E+00	2.78E-03	2.14E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	3.48E+02	1.80E-02	2.37E-02	4.73E-02	9.24E-03	0.00E+00	8.03E-02	3.89E-04	2.10E-01	8.07E-02	4.16E+00	<1	9.44E+00	<1
Zinc	8.71E+02	5.37E-01	2.88E+00	2.55E+00	2.73E-01	0.00E+00	5.71E+00	1.16E-02	5.27E-01	5.72E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-04	8.28E-02	1.64E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	2.41E+02	2.24E+01	2.03E-01	9.68E-02	8.33E-03	0.00E+00	3.08E-01	4.84E-01	1.46E-01	7.92E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	1.90E+02	0.00E+00	6.05E-07	9.05E-01	0.00E+00	0.00E+00	9.05E-01	0.00E+00	1.15E-01	9.05E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.50E+02	0.00E+00	3.84E-01	1.96E+00	0.00E+00	0.00E+00	2.34E+00	0.00E+00	1.51E-01	0.00E+00	2.34E+00			
Fluoranthene	3.70E+03	0.00E+00	2.60E+01	3.64E+01	0.00E+00	0.00E+00	6.24E+01	0.00E+00	2.24E+00	6.24E+01				
Fluorene	8.20E+01	0.00E+00	1.24E-06	2.54E+00	0.00E+00	0.00E+00	2.54E+00	0.00E+00	4.96E-02	2.54E+00				
Naphthalene	1.20E+01	0.00E+00	2.06E+00	1.71E-01	0.00E+00	0.00E+00	2.23E+00	0.00E+00	7.26E-03	2.23E+00				
Phenanthrene	1.30E+03	0.00E+00	1.02E+00	7.24E+00	0.00E+00	0.00E+00	8.26E+00	0.00E+00	7.86E-01	8.26E+00				
Total LMW PAHs							7.87E+01	0.00E+00	3.35E+00	8.20E+01	6.56E+01	1.25E+00	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	2.70E+03	3.00E-03	1.03E-01	1.39E+01	0.00E+00	0.00E+00	1.40E+01	6.48E-05	1.63E+00	1.40E+01				
Benzo[A]Pyrene	3.10E+03	3.90E-03	4.53E+00	1.34E+01	0.00E+00	0.00E+00	1.79E+01	8.42E-05	1.87E+00	1.79E+01				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	1.31E+01	2.53E+01	0.00E+00	0.00E+00	3.83E+01	2.16E-04	1.81E+00	3.83E+01				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	4.97E+01	2.10E+01	0.00E+00	0.00E+00	7.07E+01	8.42E-05	1.33E+00	7.07E+01				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	1.30E+00	2.02E+01	0.00E+00	0.00E+00	2.15E+01	0.00E+00	1.45E+00	2.15E+01				
Chrysene	2.80E+03	7.60E-03	1.05E-01	2.08E+01	0.00E+00	0.00E+00	2.09E+01	1.64E-04	1.69E+00	2.09E+01				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	1.35E+00	5.54E+00	0.00E+00	0.00E+00	6.89E+00	0.00E+00	4.47E-01	6.89E+00				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	3.09E+00	1.85E+01	0.00E+00	0.00E+00	2.16E+01	6.69E-05	1.21E+00	2.16E+01				
Pyrene	3.20E+03	7.00E-03	3.23E+01	1.81E+01	0.00E+00	0.00E+00	5.05E+01	1.51E-04	1.93E+00	5.05E+01				
Total HMW PAHs							2.62E+02	8.31E-04	1.34E+01	2.76E+02	6.15E-01	4.48E+02	3.84E+01	7.18E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	6.01E-05	3.17E-02	3.03E-04	0.00E+00	3.21E-02	0.00E+00	1.09E-04	3.21E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	2.80E+01	0.00E+00	7.39E-01	6.31E-01	3.39E-03	0.00E+00	1.37E+00	0.00E+00	1.69E-02	1.37E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-10
Screening-Level Exposure Evaluation - Grizzly Bear
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-01	0.00E+00	4.44E-01	No TRV	--	No TRV	--
Antimony	2.45E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-03	6.30E-03	0.00E+00	2.02E-03	8.32E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.95E+01	0.00E+00	0.00E+00	0.00E+00	6.46E-03	6.46E-03	0.00E+00	2.43E-02	3.07E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.23E+03	2.34E-01	0.00E+00	0.00E+00	4.34E-02	4.34E-02	1.20E-02	1.02E+00	1.07E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	1.29E+01	7.10E-04	0.00E+00	0.00E+00	1.49E-03	1.49E-03	3.65E-05	1.06E-02	1.21E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	8.55E+00	3.00E-03	0.00E+00	0.00E+00	4.03E-02	4.03E-02	1.54E-04	7.04E-03	4.75E-02	7.70E-01	<1	6.87E+00	<1
Chromium	4.73E+01	0.00E+00	0.00E+00	0.00E+00	2.03E-01	2.03E-01	0.00E+00	3.90E-02	2.42E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.58E+01	0.00E+00	0.00E+00	0.00E+00	2.18E-02	2.18E-02	0.00E+00	1.30E-02	3.49E-02	7.33E+00	<1	1.89E+01	<1
Copper	3.93E+01	1.65E-02	0.00E+00	0.00E+00	6.74E-01	6.74E-01	8.49E-04	3.23E-02	7.07E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.66E+02	7.60E-03	0.00E+00	0.00E+00	5.32E-01	5.32E-01	3.91E-04	1.36E-01	6.69E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	6.45E-02	0.00E+00	0.00E+00	0.00E+00	1.26E-03	1.26E-03	0.00E+00	5.31E-05	1.32E-03	1.41E+00	<1	1.41E+01	<1
Nickel	6.81E+02	5.59E-02	0.00E+00	0.00E+00	8.40E-01	8.40E-01	2.88E-03	5.61E-01	1.40E+00	1.70E+00	<1	1.48E+01	<1
Selenium	2.68E+00	0.00E+00	0.00E+00	0.00E+00	4.92E-02	4.92E-02	0.00E+00	2.20E-03	5.14E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	3.57E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-02	1.99E-02	0.00E+00	2.94E-03	2.28E-02	4.80E-01	<1	1.43E+00	<1
Vanadium	1.81E+02	1.80E-02	0.00E+00	0.00E+00	1.15E-01	1.15E-01	9.26E-04	1.49E-01	2.65E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.89E+02	5.37E-01	0.00E+00	0.00E+00	6.34E+00	6.34E+00	2.76E-02	4.85E-01	6.85E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.28E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	1.05E-01	1.06E-01	6.87E+01	<1	6.87E+02	<1
Fluoride	2.73E+02	2.24E+01	0.00E+00	0.00E+00	2.25E-01	2.25E-01	1.15E+00	2.25E-01	1.60E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	7.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.01E-02	6.01E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.05E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.65E-02	8.65E-02				
Fluoranthene	1.45E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E+00	1.19E+00				
Fluorene	3.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-02	2.55E-02				
Naphthalene	7.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-03	5.87E-03				
Phenanthrene	4.98E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.10E-01	4.10E-01				
Total LMW PAHs						0.00E+00	0.00E+00	1.78E+00	1.78E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.01E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	8.32E-01	8.32E-01				
Benzo(A)Pyrene	1.15E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	9.47E-01	9.47E-01				
Benzo(b)fluoranthene	1.27E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	1.04E+00	1.04E+00				
Benzo(g,h,i)perylene	8.45E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	6.96E-01	6.96E-01				
Benzo(k)fluoranthene	8.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-01	7.04E-01				
Chrysene	1.00E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	8.25E-01	8.26E-01				
Dibenz(A,H)Anthracene	2.95E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-01	2.43E-01				
Indeno (1,2,3-CD) Pyrene	7.75E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-04	6.38E-01	6.38E-01				
Pyrene	1.27E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	1.04E+00	1.04E+00				
Total HMW PAHs						0.00E+00	1.98E-03	6.97E+00	6.97E+00	6.15E-01	1.13E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-01	1.83E-01	0.00E+00	3.77E-03	1.87E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.39E+01	0.00E+00	0.00E+00	0.00E+00	4.01E-02	4.01E-02	0.00E+00	1.14E-02	5.15E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-12
Screening-Level Exposure Evaluation - Meadow Vole
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+00	0.00E+00	1.30E+00	No TRV	--	No TRV	--
Antimony	2.45E+00	0.00E+00	1.37E-02	0.00E+00	0.00E+00	1.37E-02	0.00E+00	4.78E-03	1.85E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.95E+01	0.00E+00	1.66E-01	0.00E+00	0.00E+00	1.66E-01	0.00E+00	5.76E-02	2.24E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.23E+03	2.34E-01	2.89E+01	0.00E+00	0.00E+00	2.89E+01	3.52E-02	2.41E+00	3.14E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	1.29E+01	7.10E-04	5.74E-01	0.00E+00	0.00E+00	5.74E-01	1.07E-04	2.51E-02	5.99E-01	5.32E-01	1.13E+00	6.70E-01	<1
Cadmium	8.55E+00	3.00E-03	3.02E-01	0.00E+00	0.00E+00	3.02E-01	4.51E-04	1.67E-02	3.19E-01	7.70E-01	<1	6.87E+00	<1
Chromium	4.73E+01	0.00E+00	2.92E-01	0.00E+00	0.00E+00	2.92E-01	0.00E+00	9.24E-02	3.84E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.58E+01	0.00E+00	1.78E-02	0.00E+00	0.00E+00	1.78E-02	0.00E+00	3.09E-02	4.87E-02	7.33E+00	<1	1.89E+01	<1
Copper	3.93E+01	1.65E-02	1.24E+00	0.00E+00	0.00E+00	1.24E+00	2.48E-03	7.67E-02	1.32E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.66E+02	7.60E-03	7.00E-01	0.00E+00	0.00E+00	7.00E-01	1.14E-03	3.24E-01	1.02E+00	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	6.45E-02	0.00E+00	1.25E-02	0.00E+00	0.00E+00	1.25E-02	0.00E+00	1.26E-04	1.26E-02	1.41E+00	<1	1.41E+01	<1
Nickel	6.81E+02	5.59E-02	2.14E+00	0.00E+00	0.00E+00	2.14E+00	8.40E-03	1.33E+00	3.48E+00	1.70E+00	2.05E+00	1.48E+01	<1
Selenium	2.68E+00	0.00E+00	2.26E-01	0.00E+00	0.00E+00	2.26E-01	0.00E+00	5.22E-03	2.31E-01	1.43E-01	1.62E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	3.57E+00	0.00E+00	2.15E-03	0.00E+00	0.00E+00	2.15E-03	0.00E+00	6.97E-03	9.12E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.81E+02	1.80E-02	1.32E-01	0.00E+00	0.00E+00	1.32E-01	2.70E-03	3.54E-01	4.89E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.89E+02	5.37E-01	2.49E+01	0.00E+00	0.00E+00	2.49E+01	8.07E-02	1.15E+00	2.61E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.28E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-03	2.50E-01	2.51E-01	6.87E+01	<1	6.87E+02	<1
Fluoride	2.73E+02	2.24E+01	2.46E+00	0.00E+00	0.00E+00	2.46E+00	3.37E+00	5.33E-01	6.36E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	7.30E+01	0.00E+00	1.47E-05	0.00E+00	0.00E+00	1.47E-05	0.00E+00	1.43E-01	1.43E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.05E+02	0.00E+00	2.09E+00	0.00E+00	0.00E+00	2.09E+00	0.00E+00	2.05E-01	0.00E+00	2.30E+00			
Fluoranthene	1.45E+03	0.00E+00	1.09E+02	0.00E+00	0.00E+00	1.09E+02	0.00E+00	2.83E+00	1.12E+02				
Fluorene	3.10E+01	0.00E+00	3.06E-05	0.00E+00	0.00E+00	3.06E-05	0.00E+00	6.05E-02	6.06E-02				
Naphthalene	7.13E+00	0.00E+00	1.31E+01	0.00E+00	0.00E+00	1.31E+01	0.00E+00	1.39E-02	1.31E+01				
Phenanthrene	4.98E+02	0.00E+00	5.99E+00	0.00E+00	0.00E+00	5.99E+00	0.00E+00	9.72E-01	6.96E+00				
Total LMW PAHs						1.30E+02	0.00E+00	4.23E+00	1.34E+02	6.56E+01	2.05E+00	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.01E+03	3.00E-03	6.12E-01	0.00E+00	0.00E+00	6.12E-01	4.51E-04	1.97E+00	2.58E+00				
Benzo[A]Pyrene	1.15E+03	3.90E-03	1.84E+01	0.00E+00	0.00E+00	1.84E+01	5.86E-04	2.25E+00	2.07E+01				
Benzo(b)fluoranthene	1.27E+03	1.00E-02	5.90E+01	0.00E+00	0.00E+00	5.90E+01	1.50E-03	2.48E+00	6.15E+01				
Benzo(g,h,i)perylene	8.45E+02	3.90E-03	1.72E+02	0.00E+00	0.00E+00	1.72E+02	5.86E-04	1.65E+00	1.73E+02				
Benzo(k)fluoranthene	8.55E+02	0.00E+00	5.75E+00	0.00E+00	0.00E+00	5.75E+00	0.00E+00	1.67E+00	7.42E+00				
Chrysene	1.00E+03	7.60E-03	6.09E-01	0.00E+00	0.00E+00	6.09E-01	1.14E-03	1.96E+00	2.57E+00				
Dibenz(A,H)Anthracene	2.95E+02	0.00E+00	5.76E+00	0.00E+00	0.00E+00	5.76E+00	0.00E+00	5.76E-01	6.34E+00				
Indeno (1,2,3-CD) Pyrene	7.75E+02	3.10E-03	1.28E+01	0.00E+00	0.00E+00	1.28E+01	4.66E-04	1.51E+00	1.43E+01				
Pyrene	1.27E+03	7.00E-03	1.37E+02	0.00E+00	0.00E+00	1.37E+02	1.05E-03	2.47E+00	1.39E+02				
Total HMW PAHs						4.11E+02	5.78E-03	1.65E+01	4.28E+02	6.15E-01	6.96E+02	3.84E+01	1.11E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	1.64E-02	0.00E+00	0.00E+00	1.64E-02	0.00E+00	8.94E-03	2.53E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.39E+01	0.00E+00	3.92E+00	0.00E+00	0.00E+00	3.92E+00	0.00E+00	2.71E-02	3.95E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-12
Screening-Level Exposure Evaluation - Meadow Vole
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
- IR_{diet}

= Ingestion rate of food (kg food ingested per day, dry weight)
- B(S)AF

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- DF_i

= Dietary fraction of food item i (proportion of food type in the diet)
- AUF

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
- BW

= Body weight of the receptor, wet weight (kg)
- ADD_{substrate}

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
- IR_s

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-13
Screening-Level Exposure Evaluation - Mink
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-01	0.00E+00	3.73E-01	No TRV	--	No TRV	--
Antimony	2.60E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	2.64E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	5.39E+02	2.34E-01	0.00E+00	0.00E+00	0.00E+00	1.01E-02	0.00E+00	1.01E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	1.72E+01	7.10E-04	0.00E+00	0.00E+00	0.00E+00	3.07E-05	0.00E+00	3.07E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	8.30E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	1.30E-04	0.00E+00	1.30E-04	7.70E-01	<1	6.87E+00	<1
Chromium	5.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	8.36E+01	1.65E-02	0.00E+00	0.00E+00	0.00E+00	7.14E-04	0.00E+00	7.14E-04	5.60E+00	<1	8.27E+01	<1
Lead	2.38E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-04	0.00E+00	3.29E-04	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	1.25E+03	5.59E-02	0.00E+00	0.00E+00	0.00E+00	2.42E-03	0.00E+00	2.42E-03	1.70E+00	<1	1.48E+01	<1
Selenium	3.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	4.60E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	3.48E+02	1.80E-02	0.00E+00	0.00E+00	0.00E+00	7.78E-04	0.00E+00	7.78E-04	4.16E+00	<1	9.44E+00	<1
Zinc	8.71E+02	5.37E-01	0.00E+00	0.00E+00	0.00E+00	2.32E-02	0.00E+00	2.32E-02	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.37E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-04	0.00E+00	3.29E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	2.24E+01	0.00E+00	0.00E+00	0.00E+00	9.69E-01	0.00E+00	9.69E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	1.90E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	1.20E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	2.50E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	3.70E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	8.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	1.20E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	1.30E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.70E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	1.30E-04	0.00E+00	1.30E-04				
Benzo(A)Pyrene	3.10E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	1.69E-04	0.00E+00	1.69E-04				
Benzo(b)fluoranthene	3.00E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	4.32E-04	0.00E+00	4.32E-04				
Benzo(g,h,i)perylene	2.20E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	1.69E-04	0.00E+00	1.69E-04				
Benzo(k)fluoranthene	2.40E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	2.80E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-04	0.00E+00	3.29E-04				
Dibenz(A,H)Anthracene	7.40E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	2.00E+03	3.10E-03	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	1.34E-04				
Pyrene	3.20E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	3.03E-04	0.00E+00	3.03E-04				
Total HMW PAHs					0.00E+00	1.66E-03	0.00E+00	1.66E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-13
Screening-Level Exposure Evaluation - Mink
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-14
Screening-Level Exposure Evaluation - North American Wolverine
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.59E-01	0.00E+00	2.59E-01	No TRV	--	No TRV	--
Antimony	2.45E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-03	3.68E-03	0.00E+00	2.06E-03	5.74E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.95E+01	0.00E+00	0.00E+00	0.00E+00	3.77E-03	3.77E-03	0.00E+00	2.48E-02	2.86E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.23E+03	2.34E-01	0.00E+00	0.00E+00	2.53E-02	2.53E-02	7.03E-03	1.04E+00	1.07E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	1.29E+01	7.10E-04	0.00E+00	0.00E+00	8.70E-04	8.70E-04	2.13E-05	1.08E-02	1.17E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	8.55E+00	3.00E-03	0.00E+00	0.00E+00	2.36E-02	2.36E-02	9.01E-05	7.19E-03	3.08E-02	7.70E-01	<1	6.87E+00	<1
Chromium	4.73E+01	0.00E+00	0.00E+00	0.00E+00	1.18E-01	1.18E-01	0.00E+00	3.98E-02	1.58E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.58E+01	0.00E+00	0.00E+00	0.00E+00	1.27E-02	1.27E-02	0.00E+00	1.33E-02	2.61E-02	7.33E+00	<1	1.89E+01	<1
Copper	3.93E+01	1.65E-02	0.00E+00	0.00E+00	3.93E-01	3.93E-01	4.96E-04	3.30E-02	4.27E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.66E+02	7.60E-03	0.00E+00	0.00E+00	3.11E-01	3.11E-01	2.28E-04	1.39E-01	4.50E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	6.45E-02	0.00E+00	0.00E+00	0.00E+00	7.38E-04	7.38E-04	0.00E+00	5.43E-05	7.93E-04	1.41E+00	<1	1.41E+01	<1
Nickel	6.81E+02	5.59E-02	0.00E+00	0.00E+00	4.90E-01	4.90E-01	1.68E-03	5.73E-01	1.06E+00	1.70E+00	<1	1.48E+01	<1
Selenium	2.68E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-02	2.87E-02	0.00E+00	2.25E-03	3.10E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	3.57E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-02	1.16E-02	0.00E+00	3.00E-03	1.46E-02	4.80E-01	<1	1.43E+00	<1
Vanadium	1.81E+02	1.80E-02	0.00E+00	0.00E+00	6.70E-02	6.70E-02	5.41E-04	1.52E-01	2.20E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.89E+02	5.37E-01	0.00E+00	0.00E+00	3.70E+00	3.70E+00	1.61E-02	4.96E-01	4.21E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.28E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	1.08E-01	1.08E-01	6.87E+01	<1	6.87E+02	<1
Fluoride	2.73E+02	2.24E+01	0.00E+00	0.00E+00	1.31E-01	1.31E-01	6.73E-01	2.30E-01	1.03E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	7.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-02	6.14E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.05E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.83E-02	8.83E-02				
Fluoranthene	1.45E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+00	1.22E+00				
Fluorene	3.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-02	2.61E-02				
Naphthalene	7.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-03	5.99E-03				
Phenanthrene	4.98E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.19E-01	4.19E-01				
Total LMW PAHs						0.00E+00	0.00E+00	1.82E+00	1.82E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.01E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	8.50E-01	8.50E-01				
Benzo(A)Pyrene	1.15E+03	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-04	9.67E-01	9.68E-01				
Benzo(b)fluoranthene	1.27E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	1.07E+00	1.07E+00				
Benzo(g,h,i)perylene	8.45E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-04	7.11E-01	7.11E-01				
Benzo(k)fluoranthene	8.55E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.19E-01	7.19E-01				
Chrysene	1.00E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	8.43E-01	8.44E-01				
Dibenz(A,H)Anthracene	2.95E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01	2.48E-01				
Indeno (1,2,3-CD) Pyrene	7.75E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-05	6.52E-01	6.52E-01				
Pyrene	1.27E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-04	1.06E+00	1.06E+00				
Total HMW PAHs						0.00E+00	1.16E-03	7.12E+00	7.12E+00	6.15E-01	1.16E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-01	1.07E-01	0.00E+00	3.85E-03	1.11E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.39E+01	0.00E+00	0.00E+00	0.00E+00	2.34E-02	2.34E-02	0.00E+00	1.17E-02	3.51E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-14
Screening-Level Exposure Evaluation - North American Wolverine
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H8-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	0.00E+00	1.16E+00	No TRV	--	No TRV	--
Antimony	2.45E+00	0.00E+00	0.00E+00	3.28E-01	0.00E+00	3.28E-01	0.00E+00	3.61E-03	3.32E-01	5.90E-02	5.63E+00	2.76E+00	<1
Arsenic	2.95E+01	0.00E+00	0.00E+00	3.53E-01	0.00E+00	3.53E-01	0.00E+00	4.35E-02	3.96E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.23E+03	2.34E-01	0.00E+00	1.51E+01	0.00E+00	1.51E+01	3.14E-02	1.82E+00	1.69E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	1.29E+01	7.10E-04	0.00E+00	7.76E-02	0.00E+00	7.76E-02	9.51E-05	1.90E-02	9.67E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	8.55E+00	3.00E-03	0.00E+00	6.11E+00	0.00E+00	6.11E+00	4.02E-04	1.26E-02	6.12E+00	7.70E-01	7.95E+00	6.87E+00	<1
Chromium	4.73E+01	0.00E+00	0.00E+00	1.94E+00	0.00E+00	1.94E+00	0.00E+00	6.98E-02	2.01E+00	2.40E+00	<1	5.82E+01	<1
Cobalt	1.58E+01	0.00E+00	0.00E+00	2.59E-01	0.00E+00	2.59E-01	0.00E+00	2.33E-02	2.82E-01	7.33E+00	<1	1.89E+01	<1
Copper	3.93E+01	1.65E-02	0.00E+00	2.71E+00	0.00E+00	2.71E+00	2.21E-03	5.79E-02	2.77E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.66E+02	7.60E-03	0.00E+00	6.66E+00	0.00E+00	6.66E+00	1.02E-03	2.44E-01	6.90E+00	4.70E+00	1.47E+00	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	6.45E-02	0.00E+00	0.00E+00	3.40E-02	0.00E+00	3.40E-02	0.00E+00	9.51E-05	3.41E-02	1.41E+00	<1	1.41E+01	<1
Nickel	6.81E+02	5.59E-02	0.00E+00	7.10E+01	0.00E+00	7.10E+01	7.49E-03	1.00E+00	7.20E+01	1.70E+00	4.23E+01	1.48E+01	4.86E+00
Selenium	2.68E+00	0.00E+00	0.00E+00	2.56E-01	0.00E+00	2.56E-01	0.00E+00	3.94E-03	2.60E-01	1.43E-01	1.82E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	3.57E+00	0.00E+00	0.00E+00	2.59E-02	0.00E+00	2.59E-02	0.00E+00	5.26E-03	3.11E-02	4.80E-01	<1	1.43E+00	<1
Vanadium	1.81E+02	1.80E-02	0.00E+00	1.02E+00	0.00E+00	1.02E+00	2.41E-03	2.67E-01	1.29E+00	4.16E+00	<1	9.44E+00	<1
Zinc	5.89E+02	5.37E-01	0.00E+00	9.29E+01	0.00E+00	9.29E+01	7.20E-02	8.68E-01	9.38E+01	7.54E+01	1.24E+00	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.28E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-03	1.89E-01	1.90E-01	6.87E+01	<1	6.87E+02	<1
Fluoride	2.73E+02	2.24E+01	0.00E+00	4.54E+00	0.00E+00	4.54E+00	3.00E+00	4.02E-01	7.94E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	7.30E+01	0.00E+00	0.00E+00	1.44E+01	0.00E+00	1.44E+01	0.00E+00	1.08E-01	1.45E+01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.05E+02	0.00E+00	0.00E+00	3.41E+01	0.00E+00	3.41E+01	0.00E+00	1.55E-01	3.42E+01				
Fluoranthene	1.45E+03	0.00E+00	0.00E+00	5.91E+02	0.00E+00	5.91E+02	0.00E+00	2.14E+00	5.93E+02				
Fluorene	3.10E+01	0.00E+00	0.00E+00	3.98E+01	0.00E+00	3.98E+01	0.00E+00	4.57E-02	3.98E+01				
Naphthalene	7.13E+00	0.00E+00	0.00E+00	4.20E+00	0.00E+00	4.20E+00	0.00E+00	1.05E-02	4.21E+00				
Phenanthrene	4.98E+02	0.00E+00	0.00E+00	1.15E+02	0.00E+00	1.15E+02	0.00E+00	7.33E-01	1.15E+02				
Total LMW PAHs						7.98E+02	0.00E+00	3.19E+00	8.01E+02	6.56E+01	1.22E+01	3.56E+02	2.25E+00
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.01E+03	3.00E-03	0.00E+00	2.15E+02	0.00E+00	2.15E+02	4.02E-04	1.49E+00	2.17E+02				
Benzo[A]Pyrene	1.15E+03	3.90E-03	0.00E+00	2.05E+02	0.00E+00	2.05E+02	5.23E-04	1.70E+00	2.07E+02				
Benzo(b)fluoranthene	1.27E+03	1.00E-02	0.00E+00	4.42E+02	0.00E+00	4.42E+02	1.34E-03	1.87E+00	4.44E+02				
Benzo(g,h,i)perylene	8.45E+02	3.90E-03	0.00E+00	3.33E+02	0.00E+00	3.33E+02	5.23E-04	1.25E+00	3.34E+02				
Benzo(k)fluoranthene	8.55E+02	0.00E+00	0.00E+00	2.98E+02	0.00E+00	2.98E+02	0.00E+00	1.26E+00	2.99E+02				
Chrysene	1.00E+03	7.60E-03	0.00E+00	3.08E+02	0.00E+00	3.08E+02	1.02E-03	1.48E+00	3.09E+02				
Dibenz(A,H)Anthracene	2.95E+02	0.00E+00	0.00E+00	9.13E+01	0.00E+00	9.13E+01	0.00E+00	4.35E-01	9.18E+01				
Indeno (1,2,3-CD) Pyrene	7.75E+02	3.10E-03	0.00E+00	2.97E+02	0.00E+00	2.97E+02	4.15E-04	1.14E+00	2.98E+02				
Pyrene	1.27E+03	7.00E-03	0.00E+00	2.97E+02	0.00E+00	2.97E+02	9.38E-04	1.86E+00	2.99E+02				
Total HMW PAHs						2.49E+03	5.16E-03	1.25E+01	2.50E+03	6.15E-01	4.06E+03	3.84E+01	6.50E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	0.00E+00	3.34E+01	0.00E+00	3.34E+01	0.00E+00	6.74E-03	3.34E+01	1.83E+01	1.82E+00	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.39E+01	0.00E+00	0.00E+00	1.30E+01	0.00E+00	1.30E+01	0.00E+00	2.05E-02	1.30E+01	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H8-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baselie Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	ND	3.75E-02	0	Bechtel-Jacobs (1998a) ^g	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Barium	NA	9.72E+02	1.56E-01	1.52E+02	Bechtel-Jacobs (1998a) ^g	9.10E-02	8.85E+01	Sample et al. (1998a)	6.83E-04	6.63E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	2.50E+00	Regression ^a	1.03E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.72E+01	Sample et al. (1999)	Regression ^f	4.39E-01	Sample et al. (1998b)
Chromium	NA	3.28E+01	4.10E-02	1.34E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	1.00E+01	Sample et al. (1998a)	Regression ^f	3.01E+00	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	6.94E+02	Regression ^a	2.57E+01	Bechtel-Jacobs (1998a)	5.15E-01	3.57E+02	Sample et al. (1998a)	Regression ^f	1.98E+01	Sample et al. (1998b)
Lead	NA	1.16E+02	Regression ^a	3.81E+00	Bechtel-Jacobs (1998a)	Regression ^d	3.73E+01	Sample et al. (1999)	Regression ^f	8.83E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.40E+00	Regression ^a	4.44E-01	Bechtel-Jacobs (1998a)	3.93E+00	5.50E+00	Sample et al. (1998a)	3.81E-01	5.33E-01	LANL (2015)
Nickel	NA	5.39E+01	Regression ^a	2.14E+00	Bechtel-Jacobs (1998a)	7.78E-01	4.19E+01	Sample et al. (1998a)	Regression ^f	5.01E+00	Sample et al. (1998b)
Selenium	NA	1.30E+00	Regression ^a	6.79E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.12E+00	Sample et al. (1998a)	Regression ^f	7.28E-01	Sample et al. (1998b)
Silver		2.35E+01	1.40E-02	1.66E+01	Bechtel-Jacobs (1998a)m	2.05E+00	9.38E+00	Sample et al. (1998a)	4.00E-03	2.17E+00	Sample et al. (1998b)
Thallium	NA	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	3.51E+02	Regression ^a	1.24E+02	Bechtel-Jacobs (1998a)	Regression ^d	5.85E+02	Sample et al. (1998a)	Regression ^f	1.19E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.64E+01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H9-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baselie Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	7.50E-01	Regression ^a	5.62E-02	USEPA (2007a)	1.59E+00	1.19E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	4.00E+00	Regression ^a	4.92E-01	USEPA (2007a)	1.33E+00	5.32E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^l
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^l
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^l
Bis(2-ethylhexyl)phthalate	8.39	2.20E+00	2.38E-02	5.23E-02	USEPA (2007a)	5.44E+01	1.20E+02	USEPA (2007a)	7.79E-01	1.71E+00	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^l
Di-n-butyl phthalate	4.61	5.80E-02	8.14E-01	4.72E-02	USEPA (2007a)	1.03E+01	5.98E-01	USEPA (2007a)	4.49E-01	2.60E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^l
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^l
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H9-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baselie Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H9-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H9-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baselie Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2") Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	ND	3.75E-02	0	Bechtel-Jacobs (1998a) ^g	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Barium	NA	5.80E+02	1.56E-01	9.04E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	5.27E+01	Sample et al. (1998a)	6.83E-04	3.96E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	1.75E+00	Regression ^a	8.44E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.29E+01	Sample et al. (1999)	Regression ^f	3.71E-01	Sample et al. (1998b)
Chromium	NA	2.17E+01	4.10E-02	8.90E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	6.64E+00	Sample et al. (1998a)	Regression ^f	2.22E+00	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	4.54E+02	Regression ^a	2.17E+01	Bechtel-Jacobs (1998a)	5.15E-01	2.34E+02	Sample et al. (1998a)	Regression ^f	1.86E+01	Sample et al. (1998b)
Lead	NA	8.56E+01	Regression ^a	3.22E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.91E+01	Sample et al. (1999)	Regression ^f	7.72E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.03E+00	Regression ^a	3.74E-01	Bechtel-Jacobs (1998a)	3.93E+00	4.03E+00	Sample et al. (1998a)	3.81E-01	3.91E-01	LANL (2015)
Nickel	NA	3.34E+01	Regression ^a	1.49E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.60E+01	Sample et al. (1998a)	Regression ^f	4.01E+00	Sample et al. (1998b)
Selenium	NA	7.83E-01	Regression ^a	3.88E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.75E-01	Sample et al. (1998a)	Regression ^f	6.02E-01	Sample et al. (1998b)
Silver		9.03E+00	1.40E-02	5.76E+00	Bechtel-Jacobs (1998a)m	2.05E+00	4.65E+00	Sample et al. (1998a)	4.00E-03	1.51E+00	Sample et al. (1998b)
Thallium	NA	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	2.87E+02	Regression ^a	1.11E+02	Bechtel-Jacobs (1998a)	Regression ^d	5.48E+02	Sample et al. (1998a)	Regression ^f	1.17E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	4.63E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H9-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baselie Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	6.25E-01	Regression ^a	5.04E-02	USEPA (2007a)	1.59E+00	9.94E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	3.70E+00	Regression ^a	4.56E-01	USEPA (2007a)	1.33E+00	4.92E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	1.68E+00	2.38E-02	3.99E-02	USEPA (2007a)	5.44E+01	9.13E+01	USEPA (2007a)	7.79E-01	1.31E+00	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	4.46E-02	8.14E-01	3.63E-02	USEPA (2007a)	1.03E+01	4.60E-01	USEPA (2007a)	4.49E-01	2.00E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H9-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baselie Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H9-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H9-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	2.45E+01	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	2.71E+00	9.72E+02	NA	2.82E+00	---	2.74E+03	Hamilton et al. (2002)
Beryllium	NA	0.00E+00	0.00E+00	NA	1.67E-01	---	0.00E+00	Hamilton et al. (2002)
Cadmium	NA	0.00E+00	2.50E+00	NA	4.59E-01	---	1.15E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	1.83E-01	6.94E+02	NA	6.61E-01	---	4.59E+02	Bechtel-Jacobs (1998b) ^c
Lead	NA	0.00E+00	1.16E+02	NA	8.00E-02	---	9.28E+00	Bechtel-Jacobs (1998b) ^c
Manganese		3.37E-01	0.00E+00					
Mercury	NA	0.00E+00	1.40E+00	NA	2.84E+00	---	3.97E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	0.00E+00	5.39E+01	NA	1.34E-01	---	7.22E+00	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)
Silver	NA	0.00E+00	2.35E+01	NA	1.80E-01	---	4.23E+00	Hirsch (1998)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)
Vanadium	NA	2.48E-02	2.62E+01	NA	2.50E-01	---	6.55E+00	Hamilton and Buhl (2002)
Zinc	NA	0.00E+00	3.51E+02	NA	8.40E-01	---	2.95E+02	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	1.39E-01	1.64E+01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	3.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	3.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	2.00E-02	7.04E-01	4.58E+00	---	9.15E-02	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	9.60E-02	6.73E-01	4.37E+00	---	4.20E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	1.30E+00	6.41E-01	4.17E+00	---	5.42E+00	DiToro and McGrath (2000)
Fluorene	4.21	0.00E+00	2.00E-02	6.92E-01	4.50E+00	---	8.99E-02	DiToro and McGrath (2000)

Table H9-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	5.50E-01	6.70E-01	4.36E+00	---	2.40E+00	DiToro and McGrath (2000)
Total LMW PAHs							8.42E+00	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	0.00E+00	5.70E-01	5.56E-01	3.61E+00	---	2.06E+00	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	2.80E+00	5.86E-01	3.81E+00	---	1.07E+01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	2.70E+00	5.66E-01	3.68E+00	---	9.93E+00	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	6.40E-01	5.77E-01	3.75E+00	---	2.40E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	2.60E+00	6.07E-01	3.94E+00	---	1.03E+01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	2.80E-01	5.56E-01	3.61E+00	---	1.01E+00	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	2.80E-04	3.10E+00	5.55E-01	3.61E+00	---	1.12E+01	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.30E+00	6.50E-01	4.23E+00	---	5.49E+00	DiToro and McGrath (2000)
Total HMW PAHs							5.30E+01	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					

Table H9-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lip;id} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H9-3
Screening-Level Exposure Evaluation - American Dipper
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	4.07E+00	0.00E+00	4.07E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	9.72E+02	2.71E+00	4.55E+02	0.00E+00	4.55E+02	4.50E-01	3.23E+00	4.58E+02	7.35E+01	6.24E+00	1.31E+02	3.50E+00
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	1.90E-01	0.00E+00	1.90E-01	0.00E+00	8.30E-03	1.99E-01	1.47E+00	<1	6.35E+00	<1
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	6.94E+02	1.83E-01	7.61E+01	0.00E+00	7.61E+01	3.04E-02	2.30E+00	7.85E+01	4.05E+00	1.94E+01	3.48E+01	2.25E+00
Lead	1.16E+02	0.00E+00	1.54E+00	0.00E+00	1.54E+00	0.00E+00	3.85E-01	1.92E+00	1.63E+00	1.18E+00	4.46E+01	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	5.59E-02	0.00E+00	5.59E-02	1.79E+02	<1	3.77E+02	<1
Mercury	1.40E+00	0.00E+00	6.59E-01	0.00E+00	6.59E-01	0.00E+00	4.65E-03	6.64E-01	4.50E-01	1.47E+00	9.10E-01	<1
Nickel	5.39E+01	0.00E+00	1.20E+00	0.00E+00	1.20E+00	0.00E+00	1.79E-01	1.38E+00	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	2.35E+01	0.00E+00	7.02E-01	0.00E+00	7.02E-01	0.00E+00	7.80E-02	7.80E-01	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	2.62E+01	2.48E-02	1.09E+00	0.00E+00	1.09E+00	4.12E-03	8.69E-02	1.18E+00	3.44E-01	3.42E+00	1.70E+00	<1
Zinc	3.51E+02	0.00E+00	4.89E+01	0.00E+00	4.89E+01	0.00E+00	1.16E+00	5.01E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	2.31E-02	5.44E-02	7.75E-02	4.00E-02	1.94E+00	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	2.00E-02	0.00E+00	1.52E-02	0.00E+00	1.52E-02	0.00E+00	6.64E-05	1.53E-02				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	9.60E-02	0.00E+00	6.97E-02	0.00E+00	6.97E-02	0.00E+00	3.19E-04	7.00E-02				
Fluoranthene	1.30E+00	0.00E+00	8.99E-01	0.00E+00	8.99E-01	0.00E+00	4.31E-03	9.03E-01				
Fluorene	2.00E-02	0.00E+00	1.49E-02	0.00E+00	1.49E-02	0.00E+00	6.64E-05	1.50E-02				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	5.50E-01	0.00E+00	3.98E-01	0.00E+00	3.98E-01	0.00E+00	1.83E-03	4.00E-01				
Total LMW PAHs					1.40E+00	0.00E+00	6.59E-03	1.40E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.70E-01	0.00E+00	3.42E-01	0.00E+00	3.42E-01	0.00E+00	1.89E-03	3.44E-01				
Benzo[A]Pyrene	2.80E+00	0.00E+00	1.77E+00	0.00E+00	1.77E+00	0.00E+00	9.29E-03	1.78E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	2.70E+00	0.00E+00	1.65E+00	0.00E+00	1.65E+00	0.00E+00	8.96E-03	1.66E+00				
Benzo(k)fluoranthene	6.40E-01	0.00E+00	3.98E-01	0.00E+00	3.98E-01	0.00E+00	2.12E-03	4.00E-01				
Chrysene	2.60E+00	0.00E+00	1.70E+00	0.00E+00	1.70E+00	0.00E+00	8.63E-03	1.71E+00				
Dibenz(A,H)Anthracene	2.80E-01	0.00E+00	1.68E-01	0.00E+00	1.68E-01	0.00E+00	9.29E-04	1.69E-01				
Indeno (1,2,3-CD) Pyrene	3.10E+00	2.80E-04	1.86E+00	0.00E+00	1.86E+00	4.65E-05	1.03E-02	1.87E+00				
Pyrene	1.30E+00	0.00E+00	9.12E-01	0.00E+00	9.12E-01	0.00E+00	4.31E-03	9.16E-01				
Total HMW PAHs					8.79E+00	4.65E-05	4.64E-02	8.84E+00	2.00E+00	4.42E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H9-3
Screening-Level Exposure Evaluation - American Dipper
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-4
Screening-Level Exposure Evaluation - American Woodcock
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E+00	0.00E+00	2.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	9.72E+02	2.71E+00	1.78E+00	9.35E+00	0.00E+00	1.11E+01	3.18E-01	8.56E+00	2.00E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	1.20E-02	1.81E+00	0.00E+00	1.83E+00	0.00E+00	2.20E-02	1.85E+00	1.47E+00	1.26E+00	6.35E+00	<1
Chromium	3.28E+01	0.00E+00	1.58E-02	1.06E+00	0.00E+00	1.08E+00	0.00E+00	2.89E-01	1.37E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	6.94E+02	1.83E-01	3.02E-01	3.78E+01	0.00E+00	3.81E+01	2.15E-02	6.11E+00	4.42E+01	4.05E+00	1.09E+01	3.48E+01	1.27E+00
Lead	1.16E+02	0.00E+00	4.48E-02	3.94E+00	0.00E+00	3.99E+00	0.00E+00	1.02E+00	5.01E+00	1.63E+00	3.07E+00	4.46E+01	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.96E-02	0.00E+00	3.96E-02	1.79E+02	<1	3.77E+02	<1
Mercury	1.40E+00	0.00E+00	5.21E-03	5.82E-01	0.00E+00	5.87E-01	0.00E+00	1.23E-02	5.99E-01	4.50E-01	1.33E+00	9.10E-01	<1
Nickel	5.39E+01	0.00E+00	2.51E-02	4.43E+00	0.00E+00	4.46E+00	0.00E+00	4.75E-01	4.93E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.30E+00	0.00E+00	7.98E-03	1.19E-01	0.00E+00	1.27E-01	0.00E+00	1.15E-02	1.38E-01	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	1.95E-01	9.92E-01	0.00E+00	1.19E+00	0.00E+00	2.07E-01	1.39E+00	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-03	0.00E+00	2.91E-03	3.44E-01	<1	1.70E+00	<1
Zinc	3.51E+02	0.00E+00	1.46E+00	6.18E+01	0.00E+00	6.33E+01	0.00E+00	3.09E+00	6.64E+01	6.61E+01	1.00E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-02	1.45E-01	1.61E-01	4.00E-02	4.02E+00	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.50E-01	0.00E+00	6.60E-04	1.26E-01	0.00E+00	1.27E-01	0.00E+00	6.61E-03	1.33E-01				
Benzo[A]Pyrene	4.00E+00	0.00E+00	5.78E-03	5.62E-01	0.00E+00	5.68E-01	0.00E+00	3.52E-02	6.04E-01				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	3.29E-05	--	3.29E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						6.95E-01	3.29E-05	4.19E-02	7.37E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	6.15E-04	1.27E+01	0.00E+00	1.27E+01	0.00E+00	1.94E-02	1.27E+01	1.10E+00	1.15E+01	1.10E+01	1.15E+00
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	5.55E-04	6.32E-02	0.00E+00	6.38E-02	0.00E+00	5.11E-04	6.43E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H9-4
Screening-Level Exposure Evaluation - American Woodcock
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-5
Screening-Level Exposure Evaluation - Belted Kingfisher
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	3.86E+00	0.00E+00	3.86E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	9.72E+02	2.71E+00	4.32E+01	0.00E+00	4.32E+01	4.27E-01	0.00E+00	4.36E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	1.81E-02	0.00E+00	1.81E-02	0.00E+00	0.00E+00	1.81E-02	1.47E+00	<1	6.35E+00	<1
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	6.94E+02	1.83E-01	7.23E+00	0.00E+00	7.23E+00	2.88E-02	0.00E+00	7.26E+00	4.05E+00	1.79E+00	3.48E+01	<1
Lead	1.16E+02	0.00E+00	1.46E-01	0.00E+00	1.46E-01	0.00E+00	0.00E+00	1.46E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	5.31E-02	0.00E+00	5.31E-02	1.79E+02	<1	3.77E+02	<1
Mercury	1.40E+00	0.00E+00	6.26E-02	0.00E+00	6.26E-02	0.00E+00	0.00E+00	6.26E-02	4.50E-01	<1	9.10E-01	<1
Nickel	5.39E+01	0.00E+00	1.14E-01	0.00E+00	1.14E-01	0.00E+00	0.00E+00	1.14E-01	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	2.35E+01	0.00E+00	6.67E-02	0.00E+00	6.67E-02	0.00E+00	0.00E+00	6.67E-02	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	2.62E+01	2.48E-02	1.03E-01	0.00E+00	1.03E-01	3.91E-03	0.00E+00	1.07E-01	3.44E-01	<1	1.70E+00	<1
Zinc	3.51E+02	0.00E+00	4.65E+00	0.00E+00	4.65E+00	0.00E+00	0.00E+00	4.65E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	2.19E-02	0.00E+00	2.19E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	2.00E-02	0.00E+00	1.44E-03	0.00E+00	1.44E-03	0.00E+00	0.00E+00	1.44E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	9.60E-02	0.00E+00	6.62E-03	0.00E+00	6.62E-03	0.00E+00	0.00E+00	6.62E-03				
Fluoranthene	1.30E+00	0.00E+00	8.54E-02	0.00E+00	8.54E-02	0.00E+00	0.00E+00	8.54E-02				
Fluorene	2.00E-02	0.00E+00	1.42E-03	0.00E+00	1.42E-03	0.00E+00	0.00E+00	1.42E-03				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	5.50E-01	0.00E+00	3.78E-02	0.00E+00	3.78E-02	0.00E+00	0.00E+00	3.78E-02				
Total LMW PAHs					1.33E-01	0.00E+00	0.00E+00	1.33E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.70E-01	0.00E+00	3.25E-02	0.00E+00	3.25E-02	0.00E+00	0.00E+00	3.25E-02				
Benzo[A]Pyrene	2.80E+00	0.00E+00	1.68E-01	0.00E+00	1.68E-01	0.00E+00	0.00E+00	1.68E-01				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	2.70E+00	0.00E+00	1.56E-01	0.00E+00	1.56E-01	0.00E+00	0.00E+00	1.56E-01				
Benzo(k)fluoranthene	6.40E-01	0.00E+00	3.78E-02	0.00E+00	3.78E-02	0.00E+00	0.00E+00	3.78E-02				
Chrysene	2.60E+00	0.00E+00	1.62E-01	0.00E+00	1.62E-01	0.00E+00	0.00E+00	1.62E-01				
Dibenz(A,H)Anthracene	2.80E-01	0.00E+00	1.59E-02	0.00E+00	1.59E-02	0.00E+00	0.00E+00	1.59E-02				
Indeno (1,2,3-CD) Pyrene	3.10E+00	2.80E-04	1.76E-01	0.00E+00	1.76E-01	4.41E-05	0.00E+00	1.76E-01				
Pyrene	1.30E+00	0.00E+00	8.66E-02	0.00E+00	8.66E-02	0.00E+00	0.00E+00	8.66E-02				
Total HMW PAHs					8.35E-01	4.41E-05	0.00E+00	8.35E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H9-5
Screening-Level Exposure Evaluation - Belted Kingfisher
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-6
Screening-Level Exposure Evaluation - Mourning Dove
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E+00	0.00E+00	2.80E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	9.72E+02	2.71E+00	1.73E+01	0.00E+00	0.00E+00	1.73E+01	3.09E-01	7.54E+00	2.52E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	1.17E-01	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.94E-02	1.36E-01	1.47E+00	<1	6.35E+00	<1
Chromium	3.28E+01	0.00E+00	1.53E-01	0.00E+00	0.00E+00	1.53E-01	0.00E+00	2.55E-01	4.08E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	6.94E+02	1.83E-01	2.93E+00	0.00E+00	0.00E+00	2.93E+00	2.09E-02	5.39E+00	8.34E+00	4.05E+00	2.06E+00	3.48E+01	<1
Lead	1.16E+02	0.00E+00	4.35E-01	0.00E+00	0.00E+00	4.35E-01	0.00E+00	9.00E-01	1.34E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-02	0.00E+00	3.85E-02	1.79E+02	<1	3.77E+02	<1
Mercury	1.40E+00	0.00E+00	5.06E-02	0.00E+00	0.00E+00	5.06E-02	0.00E+00	1.09E-02	6.15E-02	4.50E-01	<1	9.10E-01	<1
Nickel	5.39E+01	0.00E+00	2.44E-01	0.00E+00	0.00E+00	2.44E-01	0.00E+00	4.18E-01	6.62E-01	6.71E+00	<1	1.86E+01	<1
Selenium	1.30E+00	0.00E+00	7.75E-02	0.00E+00	0.00E+00	7.75E-02	0.00E+00	1.01E-02	8.76E-02	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	1.89E+00	0.00E+00	0.00E+00	1.89E+00	0.00E+00	1.82E-01	2.08E+00	2.02E+00	1.03E+00	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-03	0.00E+00	2.83E-03	3.44E-01	<1	1.70E+00	<1
Zinc	3.51E+02	0.00E+00	1.42E+01	0.00E+00	0.00E+00	1.42E+01	0.00E+00	2.72E+00	1.69E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-02	1.27E-01	1.43E-01	4.00E-02	3.58E+00	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.50E-01	0.00E+00	6.41E-03	0.00E+00	0.00E+00	6.41E-03	0.00E+00	5.82E-03	1.22E-02				
Benzo[A]Pyrene	4.00E+00	0.00E+00	5.61E-02	0.00E+00	0.00E+00	5.61E-02	0.00E+00	3.10E-02	8.72E-02				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	3.20E-05	--	3.20E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						6.25E-02	3.20E-05	3.69E-02	9.94E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	5.97E-03	0.00E+00	0.00E+00	5.97E-03	0.00E+00	1.71E-02	2.30E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	5.39E-03	0.00E+00	0.00E+00	5.39E-03	0.00E+00	4.50E-04	5.84E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H9-6
Screening-Level Exposure Evaluation - Mourning Dove
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E+00	0.00E+00	2.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	9.72E+02	2.71E+00	0.00E+00	0.00E+00	5.44E-02	5.44E-02	2.22E-01	2.07E+00	2.35E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-02	3.60E-02	0.00E+00	5.33E-03	4.13E-02	1.47E+00	<1	6.35E+00	<1
Chromium	3.28E+01	0.00E+00	0.00E+00	0.00E+00	2.47E-01	2.47E-01	0.00E+00	6.99E-02	3.17E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	6.94E+02	1.83E-01	0.00E+00	0.00E+00	1.63E+00	1.63E+00	1.50E-02	1.48E+00	3.12E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.16E+02	0.00E+00	0.00E+00	0.00E+00	7.24E-01	7.24E-01	0.00E+00	2.47E-01	9.71E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-02	0.00E+00	2.76E-02	1.79E+02	<1	3.77E+02	<1
Mercury	1.40E+00	0.00E+00	0.00E+00	0.00E+00	4.37E-02	4.37E-02	0.00E+00	2.99E-03	4.67E-02	4.50E-01	<1	9.10E-01	<1
Nickel	5.39E+01	0.00E+00	0.00E+00	0.00E+00	4.11E-01	4.11E-01	0.00E+00	1.15E-01	5.26E-01	6.71E+00	<1	1.86E+01	<1
Selenium	1.30E+00	0.00E+00	0.00E+00	0.00E+00	5.97E-02	5.97E-02	0.00E+00	2.77E-03	6.25E-02	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	0.00E+00	0.00E+00	1.78E-01	1.78E-01	0.00E+00	5.01E-02	2.28E-01	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-03	0.00E+00	2.03E-03	3.44E-01	<1	1.70E+00	<1
Zinc	3.51E+02	0.00E+00	0.00E+00	0.00E+00	9.74E+00	9.74E+00	0.00E+00	7.48E-01	1.05E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-02	3.50E-02	4.64E-02	4.00E-02	1.16E+00	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-03	1.60E-03				
Benzo[A]Pyrene	4.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.53E-03	8.53E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	2.30E-05	1.01E-02	1.02E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-01	1.41E-01	0.00E+00	4.69E-03	1.45E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	0.00E+00	0.00E+00	2.14E-03	2.14E-03	0.00E+00	1.24E-04	2.26E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H9-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.88E+00	0.00E+00	3.88E+00	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	9.72E+02	2.71E+00	0.00E+00	1.40E+01	0.00E+00	1.40E+01	4.29E-01	0.00E+00	1.44E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	2.72E+00	0.00E+00	2.72E+00	0.00E+00	0.00E+00	2.72E+00	1.47E+00	1.85E+00	6.35E+00	<1
Chromium	3.28E+01	0.00E+00	0.00E+00	1.59E+00	0.00E+00	1.59E+00	0.00E+00	0.00E+00	1.59E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	6.94E+02	1.83E-01	0.00E+00	5.66E+01	0.00E+00	5.66E+01	2.90E-02	0.00E+00	5.66E+01	4.05E+00	1.40E+01	3.48E+01	1.63E+00
Lead	1.16E+02	0.00E+00	0.00E+00	5.90E+00	0.00E+00	5.90E+00	0.00E+00	0.00E+00	5.90E+00	1.63E+00	3.62E+00	4.46E+01	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-02	0.00E+00	5.34E-02	1.79E+02	<1	3.77E+02	<1
Mercury	1.40E+00	0.00E+00	0.00E+00	8.71E-01	0.00E+00	8.71E-01	0.00E+00	0.00E+00	8.71E-01	4.50E-01	1.94E+00	9.10E-01	<1
Nickel	5.39E+01	0.00E+00	0.00E+00	6.64E+00	0.00E+00	6.64E+00	0.00E+00	0.00E+00	6.64E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.30E+00	0.00E+00	0.00E+00	1.78E-01	0.00E+00	1.78E-01	0.00E+00	0.00E+00	1.78E-01	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	0.00E+00	1.49E+00	0.00E+00	1.49E+00	0.00E+00	0.00E+00	1.49E+00	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-03	0.00E+00	3.93E-03	3.44E-01	<1	1.70E+00	<1
Zinc	3.51E+02	0.00E+00	0.00E+00	9.26E+01	0.00E+00	9.26E+01	0.00E+00	0.00E+00	9.26E+01	6.61E+01	1.40E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-02	0.00E+00	2.20E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.50E-01	0.00E+00	0.00E+00	1.89E-01	0.00E+00	1.89E-01	0.00E+00	0.00E+00	1.89E-01				
Benzo[A]Pyrene	4.00E+00	0.00E+00	0.00E+00	8.42E-01	0.00E+00	8.42E-01	0.00E+00	0.00E+00	8.42E-01				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	4.43E-05	--	4.43E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.03E+00	4.43E-05	0.00E+00	1.03E+00	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	0.00E+00	1.90E+01	0.00E+00	1.90E+01	0.00E+00	0.00E+00	1.90E+01	1.10E+00	1.72E+01	1.10E+01	1.72E+00
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	0.00E+00	9.47E-02	0.00E+00	9.47E-02	0.00E+00	0.00E+00	9.47E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H9-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-9
Screening-Level Exposure Evaluation - Canada Lynx
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-01	0.00E+00	7.65E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	9.72E+02	2.71E+00	0.00E+00	0.00E+00	2.07E-02	2.07E-02	8.47E-02	8.50E-01	9.56E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02	1.37E-02	0.00E+00	2.19E-03	1.59E-02	7.70E-01	<1	6.87E+00	<1
Chromium	3.28E+01	0.00E+00	0.00E+00	0.00E+00	9.40E-02	9.40E-02	0.00E+00	2.87E-02	1.23E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	6.94E+02	1.83E-01	0.00E+00	0.00E+00	6.19E-01	6.19E-01	5.72E-03	6.07E-01	1.23E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.16E+02	0.00E+00	0.00E+00	0.00E+00	2.76E-01	2.76E-01	0.00E+00	1.01E-01	3.77E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-02	0.00E+00	1.05E-02	5.15E+01	<1	1.46E+02	<1
Mercury	1.40E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-02	1.67E-02	0.00E+00	1.22E-03	1.79E-02	1.41E+00	<1	1.41E+01	<1
Nickel	5.39E+01	0.00E+00	0.00E+00	0.00E+00	1.56E-01	1.56E-01	0.00E+00	4.72E-02	2.04E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.30E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-02	2.28E-02	0.00E+00	1.14E-03	2.39E-02	1.43E-01	<1	6.60E-01	<1
Silver	2.35E+01	0.00E+00	0.00E+00	0.00E+00	6.76E-02	6.76E-02	0.00E+00	2.06E-02	8.82E-02	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.75E-04	0.00E+00	7.75E-04	4.16E+00	<1	9.44E+00	<1
Zinc	3.51E+02	0.00E+00	0.00E+00	0.00E+00	3.71E+00	3.71E+00	0.00E+00	3.07E-01	4.02E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.34E-03	1.43E-02	1.87E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-04	6.56E-04				
Benzo[A]Pyrene	4.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-03	3.50E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	8.75E-06	--	8.75E-06				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	8.75E-06	4.16E-03	4.16E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-02	5.35E-02	0.00E+00	1.92E-03	5.55E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	0.00E+00	0.00E+00	8.14E-04	8.14E-04	0.00E+00	5.07E-05	8.64E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-9
Screening-Level Exposure Evaluation - Canada Lynx
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-10
Screening-Level Exposure Evaluation - Grizzly Bear
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-01	0.00E+00	5.29E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	9.72E+02	2.71E+00	2.13E+00	2.87E-01	1.43E-03	0.00E+00	2.42E+00	5.85E-02	5.88E-01	2.47E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	2.50E+00	0.00E+00	1.44E-02	5.56E-02	9.47E-04	0.00E+00	7.09E-02	0.00E+00	1.51E-03	7.09E-02	7.70E-01	<1	6.87E+00	<1
Chromium	3.28E+01	0.00E+00	1.89E-02	3.25E-02	6.50E-03	0.00E+00	5.79E-02	0.00E+00	1.98E-02	5.79E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	6.94E+02	1.83E-01	3.60E-01	1.16E+00	4.28E-02	0.00E+00	1.56E+00	3.95E-03	4.20E-01	1.57E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.16E+02	0.00E+00	5.35E-02	1.21E-01	1.91E-02	0.00E+00	1.93E-01	0.00E+00	7.01E-02	1.93E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.28E-03	0.00E+00	7.28E-03	5.15E+01	<1	1.46E+02	<1
Mercury	1.40E+00	0.00E+00	6.23E-03	1.78E-02	1.15E-03	0.00E+00	2.52E-02	0.00E+00	8.47E-04	2.52E-02	1.41E+00	<1	1.41E+01	<1
Nickel	5.39E+01	0.00E+00	3.00E-02	1.36E-01	1.08E-02	0.00E+00	1.77E-01	0.00E+00	3.26E-02	1.77E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.30E+00	0.00E+00	9.53E-03	3.64E-03	1.57E-03	0.00E+00	1.47E-02	0.00E+00	7.86E-04	1.47E-02	1.43E-01	<1	6.60E-01	<1
Silver	2.35E+01	0.00E+00	2.33E-01	3.04E-02	4.68E-03	0.00E+00	2.68E-01	0.00E+00	1.42E-02	2.68E-01	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-04	0.00E+00	5.36E-04	4.16E+00	<1	9.44E+00	<1
Zinc	3.51E+02	0.00E+00	1.74E+00	1.89E+00	2.56E-01	0.00E+00	3.89E+00	0.00E+00	2.12E-01	3.89E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-03	9.92E-03	3.00E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	7.50E-01	0.00E+00	7.89E-04	3.86E-03	0.00E+00	0.00E+00	4.65E-03	0.00E+00	4.54E-04	4.65E-03				
Benzo(a)Pyrene	4.00E+00	0.00E+00	6.90E-03	1.72E-02	0.00E+00	0.00E+00	2.41E-02	0.00E+00	2.42E-03	2.41E-02				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	0.00E+00	6.05E-06	--	6.05E-06				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs							2.88E-02	6.05E-06	2.87E-03	3.17E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	7.35E-04	3.88E-01	3.70E-03	0.00E+00	3.92E-01	0.00E+00	1.33E-03	3.92E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	6.63E-04	1.94E-03	5.62E-05	0.00E+00	2.66E-03	0.00E+00	3.51E-05	2.66E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-10
Screening-Level Exposure Evaluation - Grizzly Bear
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	5.80E+02	2.71E+00	0.00E+00	0.00E+00	2.04E-02	2.04E-02	1.39E-01	4.77E-01	6.37E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-02	1.91E-02	0.00E+00	1.44E-03	2.05E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.17E+01	0.00E+00	0.00E+00	0.00E+00	1.14E-01	1.14E-01	0.00E+00	1.79E-02	1.32E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.54E+02	1.83E-01	0.00E+00	0.00E+00	9.59E-01	9.59E-01	9.42E-03	3.74E-01	1.34E+00	5.60E+00	<1	8.27E+01	<1
Lead	8.56E+01	0.00E+00	0.00E+00	0.00E+00	3.97E-01	3.97E-01	0.00E+00	7.04E-02	4.68E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-02	0.00E+00	1.73E-02	5.15E+01	<1	1.46E+02	<1
Mercury	1.03E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-02	2.01E-02	0.00E+00	8.44E-04	2.09E-02	1.41E+00	<1	1.41E+01	<1
Nickel	3.34E+01	0.00E+00	0.00E+00	0.00E+00	2.06E-01	2.06E-01	0.00E+00	2.75E-02	2.34E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	0.00E+00	0.00E+00	3.10E-02	3.10E-02	0.00E+00	6.44E-04	3.16E-02	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	0.00E+00	0.00E+00	7.77E-02	7.77E-02	0.00E+00	7.43E-03	8.52E-02	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	0.00E+00	1.28E-03	4.16E+00	<1	9.44E+00	<1
Zinc	2.87E+02	0.00E+00	0.00E+00	0.00E+00	6.02E+00	6.02E+00	0.00E+00	2.37E-01	6.26E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.63E+00	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.15E-03	3.81E-03	1.10E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	6.25E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	5.15E-04				
Benzo(A)Pyrene	3.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.05E-03	3.05E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	1.44E-05	3.56E-03	3.58E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	0.00E+00	0.00E+00	6.73E-02	6.73E-02	0.00E+00	1.38E-03	6.87E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.46E-02	0.00E+00	0.00E+00	0.00E+00	1.03E-03	1.03E-03	0.00E+00	3.67E-05	1.07E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-12
Screening-Level Exposure Evaluation - Meadow Vole
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00	3.68E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	5.80E+02	2.71E+00	1.36E+01	0.00E+00	0.00E+00	1.36E+01	4.07E-01	1.13E+00	1.51E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	1.27E-01	0.00E+00	0.00E+00	1.27E-01	0.00E+00	3.42E-03	1.30E-01	7.70E-01	<1	6.87E+00	<1
Chromium	2.17E+01	0.00E+00	1.34E-01	0.00E+00	0.00E+00	1.34E-01	0.00E+00	4.24E-02	1.76E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.54E+02	1.83E-01	3.26E+00	0.00E+00	0.00E+00	3.26E+00	2.75E-02	8.87E-01	4.18E+00	5.60E+00	<1	8.27E+01	<1
Lead	8.56E+01	0.00E+00	4.83E-01	0.00E+00	0.00E+00	4.83E-01	0.00E+00	1.67E-01	6.50E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-02	0.00E+00	5.06E-02	5.15E+01	<1	1.46E+02	<1
Mercury	1.03E+00	0.00E+00	5.62E-02	0.00E+00	0.00E+00	5.62E-02	0.00E+00	2.00E-03	5.82E-02	1.41E+00	<1	1.41E+01	<1
Nickel	3.34E+01	0.00E+00	2.25E-01	0.00E+00	0.00E+00	2.25E-01	0.00E+00	6.53E-02	2.90E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	5.82E-02	0.00E+00	0.00E+00	5.82E-02	0.00E+00	1.53E-03	5.98E-02	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	8.66E-01	0.00E+00	0.00E+00	8.66E-01	0.00E+00	1.76E-02	8.84E-01	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-03	0.00E+00	3.73E-03	4.16E+00	<1	9.44E+00	<1
Zinc	2.87E+02	0.00E+00	1.67E+01	0.00E+00	0.00E+00	1.67E+01	0.00E+00	5.61E-01	1.73E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.63E+00	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-02	9.05E-03	2.99E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	6.25E-01	0.00E+00	7.58E-03	0.00E+00	0.00E+00	7.58E-03	0.00E+00	1.22E-03	8.80E-03				
Benzo[A]Pyrene	3.70E+00	0.00E+00	6.85E-02	0.00E+00	0.00E+00	6.85E-02	0.00E+00	7.23E-03	7.57E-02				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	4.21E-05	--	4.21E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						7.60E-02	4.21E-05	8.45E-03	8.45E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	6.00E-03	0.00E+00	0.00E+00	6.00E-03	0.00E+00	3.28E-03	9.28E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.46E-02	0.00E+00	5.46E-03	0.00E+00	0.00E+00	5.46E-03	0.00E+00	8.72E-05	5.55E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-12
Screening-Level Exposure Evaluation - Meadow Vole
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
- IR_{diet}

= Ingestion rate of food (kg food ingested per day, dry weight)
- B(S)AF

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- DF_i

= Dietary fraction of food item i (proportion of food type in the diet)
- AUF

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
- BW

= Body weight of the receptor, wet weight (kg)
- ADD_{substrate}

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
- IR_s

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-13
Screening-Level Exposure Evaluation - Mink
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	1.06E+00	0.00E+00	1.06E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	9.72E+02	2.71E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.17E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	6.94E+02	1.83E-01	0.00E+00	0.00E+00	0.00E+00	7.91E-03	0.00E+00	7.91E-03	5.60E+00	<1	8.27E+01	<1
Lead	1.16E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	1.46E-02	0.00E+00	1.46E-02	5.15E+01	<1	1.46E+02	<1
Mercury	1.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	5.39E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	2.35E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	2.62E+01	2.48E-02	0.00E+00	0.00E+00	0.00E+00	1.07E-03	0.00E+00	1.07E-03	4.16E+00	<1	9.44E+00	<1
Zinc	3.51E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	1.64E+01	1.39E-01	0.00E+00	0.00E+00	0.00E+00	6.01E-03	0.00E+00	6.01E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	2.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	9.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	2.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	5.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.70E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo[A]Pyrene	2.80E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	2.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(k)fluoranthene	6.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	2.60E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Dibenz(A,H)Anthracene	2.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	3.10E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	1.21E-05	0.00E+00	1.21E-05				
Pyrene	1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total HMW PAHs					0.00E+00	1.21E-05	0.00E+00	1.21E-05	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-13
Screening-Level Exposure Evaluation - Mink
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-14
Screening-Level Exposure Evaluation - North American Wolverine
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.36E-01	0.00E+00	7.36E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	5.80E+02	2.71E+00	0.00E+00	0.00E+00	1.19E-02	1.19E-02	8.14E-02	4.88E-01	5.81E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-02	1.11E-02	0.00E+00	1.47E-03	1.26E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.17E+01	0.00E+00	0.00E+00	0.00E+00	6.67E-02	6.67E-02	0.00E+00	1.83E-02	8.50E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.54E+02	1.83E-01	0.00E+00	0.00E+00	5.60E-01	5.60E-01	5.50E-03	3.82E-01	9.48E-01	5.60E+00	<1	8.27E+01	<1
Lead	8.56E+01	0.00E+00	0.00E+00	0.00E+00	2.32E-01	2.32E-01	0.00E+00	7.20E-02	3.04E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-02	0.00E+00	1.01E-02	5.15E+01	<1	1.46E+02	<1
Mercury	1.03E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-02	1.17E-02	0.00E+00	8.62E-04	1.26E-02	1.41E+00	<1	1.41E+01	<1
Nickel	3.34E+01	0.00E+00	0.00E+00	0.00E+00	1.20E-01	1.20E-01	0.00E+00	2.81E-02	1.49E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	0.00E+00	0.00E+00	1.81E-02	1.81E-02	0.00E+00	6.58E-04	1.87E-02	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-02	4.54E-02	0.00E+00	7.59E-03	5.30E-02	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.45E-04	0.00E+00	7.45E-04	4.16E+00	<1	9.44E+00	<1
Zinc	2.87E+02	0.00E+00	0.00E+00	0.00E+00	3.52E+00	3.52E+00	0.00E+00	2.42E-01	3.76E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.63E+00	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E-03	3.90E-03	8.07E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	6.25E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E-04	5.26E-04				
Benzo[A]Pyrene	3.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E-03	3.11E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	8.41E-06	--	8.41E-06				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	8.41E-06	3.64E-03	3.65E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-02	3.93E-02	0.00E+00	1.41E-03	4.07E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.46E-02	0.00E+00	0.00E+00	0.00E+00	6.02E-04	6.02E-04	0.00E+00	3.75E-05	6.40E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-14
Screening-Level Exposure Evaluation - North American Wolverine
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H9-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E+00	0.00E+00	3.28E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	5.80E+02	2.71E+00	0.00E+00	7.07E+00	0.00E+00	7.07E+00	3.63E-01	8.54E-01	8.28E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	0.00E+00	1.73E+00	0.00E+00	1.73E+00	0.00E+00	2.58E-03	1.73E+00	7.70E-01	2.25E+00	6.87E+00	<1
Chromium	2.17E+01	0.00E+00	0.00E+00	8.90E-01	0.00E+00	8.90E-01	0.00E+00	3.20E-02	9.22E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.54E+02	1.83E-01	0.00E+00	3.13E+01	0.00E+00	3.13E+01	2.45E-02	6.69E-01	3.20E+01	5.60E+00	5.72E+00	8.27E+01	<1
Lead	8.56E+01	0.00E+00	0.00E+00	3.91E+00	0.00E+00	3.91E+00	0.00E+00	1.26E-01	4.03E+00	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	3.37E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.52E-02	0.00E+00	4.52E-02	5.15E+01	<1	1.46E+02	<1
Mercury	1.03E+00	0.00E+00	0.00E+00	5.40E-01	0.00E+00	5.40E-01	0.00E+00	1.51E-03	5.41E-01	1.41E+00	<1	1.41E+01	<1
Nickel	3.34E+01	0.00E+00	0.00E+00	3.48E+00	0.00E+00	3.48E+00	0.00E+00	4.93E-02	3.53E+00	1.70E+00	2.08E+00	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	0.00E+00	1.04E-01	0.00E+00	1.04E-01	0.00E+00	1.15E-03	1.05E-01	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	0.00E+00	6.24E-01	0.00E+00	6.24E-01	0.00E+00	1.33E-02	6.37E-01	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	2.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E-03	0.00E+00	3.32E-03	4.16E+00	<1	9.44E+00	<1
Zinc	2.87E+02	0.00E+00	0.00E+00	7.34E+01	0.00E+00	7.34E+01	0.00E+00	4.23E-01	7.38E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.63E+00	1.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-02	6.83E-03	2.55E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	6.25E-01	0.00E+00	0.00E+00	1.33E-01	0.00E+00	1.33E-01	0.00E+00	9.21E-04	1.34E-01				
Benzo[A]Pyrene	3.70E+00	0.00E+00	0.00E+00	6.59E-01	0.00E+00	6.59E-01	0.00E+00	5.45E-03	6.65E-01				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	3.75E-05	--	3.75E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						7.93E-01	3.75E-05	6.38E-03	7.99E-01	6.15E-01	1.30E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	0.00E+00	1.22E+01	0.00E+00	1.22E+01	0.00E+00	2.47E-03	1.22E+01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	4.46E-02	0.00E+00	0.00E+00	6.17E-02	0.00E+00	6.17E-02	0.00E+00	6.58E-05	6.17E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H9-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	7.80E+00	3.75E-02	2.93E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.03E+00	Sample et al. (1999)	Regression ^f	4.22E-02	Sample et al. (1998b)
Barium	NA	2.95E+02	1.56E-01	4.60E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.68E+01	Sample et al. (1998a)	6.83E-04	2.01E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	2.78E+01	Regression ^a	7.23E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.43E+01	Sample et al. (1998a)	Regression ^f	1.25E+01	Sample et al. (1998b)
Lead	NA	1.85E+01	Regression ^a	1.36E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.47E+00	Sample et al. (1999)	Regression ^f	3.92E+00	Sample et al. (1998b)
Manganese	NA	1.64E+03	7.90E-02	1.30E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	6.94E+01	Sample et al. (1999)	2.05E-02	3.36E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	4.38E+01	Regression ^a	1.83E+00	Bechtel-Jacobs (1998a)	7.78E-01	3.41E+01	Sample et al. (1998a)	Regression ^f	4.55E+00	Sample et al. (1998b)
Selenium	NA	1.40E+00	Regression ^a	7.37E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.19E+00	Sample et al. (1998a)	Regression ^f	7.49E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.80E+01	4.85E-03	8.73E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.56E-01	Sample et al. (1998a)	1.23E-02	2.21E-01	Sample et al. (1998b) ⁱ
Zinc	NA	1.29E+02	Regression ^a	7.13E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.21E+02	Sample et al. (1998a)	Regression ^f	1.11E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.50E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H10-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	1.00E+00	Regression ^a	6.67E-02	USEPA (2007a)	1.59E+00	1.59E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	4.50E-02	2.38E-02	1.07E-03	USEPA (2007a)	5.44E+01	2.45E+00	USEPA (2007a)	7.79E-01	3.51E-02	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	3.90E-02	8.14E-01	3.18E-02	USEPA (2007a)	1.03E+01	4.02E-01	USEPA (2007a)	4.49E-01	1.75E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H10-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H10-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:
BAF, Bioaccumulation Factor
HMW, High Molecular Weight
LMW, Low Molecular Weight
mg/kg, milligrams per kilogram
USEPA, United States Environmental Protection Agency

a. Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln(\text{[tissue]}) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b. Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c. Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d. Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln(\text{[tissue]}) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e. Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f. Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f. Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln(\text{[tissue]}) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g. Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h. USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i. Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j. No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H10-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	7.80E+00	3.75E-02	2.93E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.03E+00	Sample et al. (1999)	Regression ^f	4.22E-02	Sample et al. (1998b)
Barium	NA	2.95E+02	1.56E-01	4.60E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.68E+01	Sample et al. (1998a)	6.83E-04	2.01E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	2.78E+01	Regression ^a	7.23E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.43E+01	Sample et al. (1998a)	Regression ^f	1.25E+01	Sample et al. (1998b)
Lead	NA	1.85E+01	Regression ^a	1.36E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.47E+00	Sample et al. (1999)	Regression ^f	3.92E+00	Sample et al. (1998b)
Manganese	NA	1.64E+03	7.90E-02	1.30E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	6.94E+01	Sample et al. (1999)	2.05E-02	3.36E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	4.38E+01	Regression ^a	1.83E+00	Bechtel-Jacobs (1998a)	7.78E-01	3.41E+01	Sample et al. (1998a)	Regression ^f	4.55E+00	Sample et al. (1998b)
Selenium	NA	1.40E+00	Regression ^a	7.37E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.19E+00	Sample et al. (1998a)	Regression ^f	7.49E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a) ^m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.80E+01	4.85E-03	8.73E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.56E-01	Sample et al. (1998a)	1.23E-02	2.21E-01	Sample et al. (1998b) ⁱ
Zinc	NA	1.29E+02	Regression ^a	7.13E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.21E+02	Sample et al. (1998a)	Regression ^f	1.11E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.50E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H10-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	1.00E+00	Regression ^a	6.67E-02	USEPA (2007a)	1.59E+00	1.59E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	4.50E-02	2.38E-02	1.07E-03	USEPA (2007a)	5.44E+01	2.45E+00	USEPA (2007a)	7.79E-01	3.51E-02	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	3.90E-02	8.14E-01	3.18E-02	USEPA (2007a)	1.03E+01	4.02E-01	USEPA (2007a)	4.49E-01	1.75E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H10-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H10-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H10-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	1.61E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	2.09E-01	2.95E+02	NA	2.82E+00	---	8.32E+02	Hamilton et al. (2002)
Beryllium	NA	0.00E+00	1.00E+00	NA	1.67E-01	---	1.67E-01	Hamilton et al. (2002)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	0.00E+00	0.00E+00	NA	6.61E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Manganese		3.75E+00	1.64E+03					
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	0.00E+00	4.38E+01	NA	1.34E-01	---	5.87E+00	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)
Vanadium	NA	2.20E-03	1.80E+01	NA	2.50E-01	---	4.50E+00	Hamilton and Buhl (2002)
Zinc	NA	0.00E+00	1.29E+02	NA	8.40E-01	---	1.08E+02	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	0.00E+00	1.50E+00	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aquirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	3.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	3.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	7.50E-02	7.04E-01	4.58E+00	---	3.43E-01	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	1.40E-01	6.73E-01	4.37E+00	---	6.12E-01	DiToro and McGrath (2000)

Table H10-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Fluoranthene	5.08	0.00E+00	1.80E+00	6.41E-01	4.17E+00	---	7.50E+00	DiToro and McGrath (2000)
Fluorene	4.21	0.00E+00	5.30E-02	6.92E-01	4.50E+00	---	2.38E-01	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	4.50E-02	7.45E-01	4.84E+00	---	2.18E-01	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	8.10E-01	6.70E-01	4.36E+00	---	3.53E+00	DiToro and McGrath (2000)
Total LMW PAHs							1.24E+01	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	0.00E+00	1.00E+00	5.56E-01	3.61E+00	---	3.61E+00	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	1.40E+00	5.86E-01	3.81E+00	---	5.33E+00	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	1.30E+00	5.66E-01	3.68E+00	---	4.78E+00	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	7.50E-01	5.77E-01	3.75E+00	---	2.81E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	1.40E+00	6.07E-01	3.94E+00	---	5.52E+00	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	2.80E-01	5.56E-01	3.61E+00	---	1.01E+00	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	1.30E+00	5.55E-01	3.61E+00	---	4.69E+00	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.50E+00	6.50E-01	4.23E+00	---	6.34E+00	DiToro and McGrath (2000)
Total HMW PAHs							3.41E+01	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)

Table H10-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:

- NA, Normalized BSAF was not applicable for metals
- a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where $BSAF = K_{ow}^{-0.038}$ (DiToro and McGrath 2000)
- b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:
- $$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$
- where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)
- f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)
- f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)
- c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H10-3
Screening-Level Exposure Evaluation - American Dipper
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-01	0.00E+00	2.67E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	2.95E+02	2.09E-01	1.38E+02	0.00E+00	1.38E+02	3.47E-02	9.79E-01	1.39E+02	7.35E+01	1.89E+00	1.31E+02	1.06E+00
Beryllium	1.00E+00	0.00E+00	2.77E-02	0.00E+00	2.77E-02	0.00E+00	3.32E-03	3.10E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	0.00E+00	6.22E-01	5.44E+00	6.06E+00	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	4.38E+01	0.00E+00	9.74E-01	0.00E+00	9.74E-01	0.00E+00	1.45E-01	1.12E+00	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.80E+01	2.20E-03	7.47E-01	0.00E+00	7.47E-01	3.65E-04	5.97E-02	8.07E-01	3.44E-01	2.35E+00	1.70E+00	<1
Zinc	1.29E+02	0.00E+00	1.80E+01	0.00E+00	1.80E+01	0.00E+00	4.28E-01	1.84E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98E-03	4.98E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	7.50E-02	0.00E+00	5.70E-02	0.00E+00	5.70E-02	0.00E+00	2.49E-04	5.72E-02				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.40E-01	0.00E+00	1.02E-01	0.00E+00	1.02E-01	0.00E+00	4.65E-04	1.02E-01				
Fluoranthene	1.80E+00	0.00E+00	1.24E+00	0.00E+00	1.24E+00	0.00E+00	5.97E-03	1.25E+00				
Fluorene	5.30E-02	0.00E+00	3.95E-02	0.00E+00	3.95E-02	0.00E+00	1.76E-04	3.97E-02				
Naphthalene	4.50E-02	0.00E+00	3.62E-02	0.00E+00	3.62E-02	0.00E+00	1.49E-04	3.63E-02				
Phenanthrene	8.10E-01	0.00E+00	5.86E-01	0.00E+00	5.86E-01	0.00E+00	2.69E-03	5.88E-01				
Total LMW PAHs					2.06E+00	0.00E+00	9.70E-03	2.07E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.00E+00	0.00E+00	6.00E-01	0.00E+00	6.00E-01	0.00E+00	3.32E-03	6.03E-01				
Benzo(A)Pyrene	1.40E+00	0.00E+00	8.85E-01	0.00E+00	8.85E-01	0.00E+00	4.65E-03	8.89E-01				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.30E+00	0.00E+00	7.93E-01	0.00E+00	7.93E-01	0.00E+00	4.31E-03	7.98E-01				
Benzo(k)fluoranthene	7.50E-01	0.00E+00	4.67E-01	0.00E+00	4.67E-01	0.00E+00	2.49E-03	4.69E-01				
Chrysene	1.40E+00	0.00E+00	9.16E-01	0.00E+00	9.16E-01	0.00E+00	4.65E-03	9.21E-01				
Dibenz(A,H)Anthracene	2.80E-01	0.00E+00	1.68E-01	0.00E+00	1.68E-01	0.00E+00	9.29E-04	1.69E-01				
Indeno (1,2,3-CD) Pyrene	1.30E+00	0.00E+00	7.79E-01	0.00E+00	7.79E-01	0.00E+00	4.31E-03	7.83E-01				
Pyrene	1.50E+00	0.00E+00	1.05E+00	0.00E+00	1.05E+00	0.00E+00	4.98E-03	1.06E+00				
Total HMW PAHs					5.66E+00	0.00E+00	2.96E-02	5.69E+00	2.00E+00	2.84E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H10-3
Screening-Level Exposure Evaluation - American Dipper
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-4
Screening-Level Exposure Evaluation - American Woodcock
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-01	0.00E+00	1.89E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	7.80E+00	0.00E+00	3.44E-03	1.09E-01	0.00E+00	1.12E-01	0.00E+00	6.87E-02	1.81E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	2.09E-01	5.41E-01	2.84E+00	0.00E+00	3.38E+00	2.46E-02	2.60E+00	6.00E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.78E+01	0.00E+00	8.49E-02	1.51E+00	0.00E+00	1.60E+00	0.00E+00	2.45E-01	1.84E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	0.00E+00	1.60E-02	8.96E-01	0.00E+00	9.12E-01	0.00E+00	1.63E-01	1.07E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.64E+03	3.75E+00	1.52E+00	7.33E+00	0.00E+00	8.86E+00	4.41E-01	1.45E+01	2.37E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	4.38E+01	0.00E+00	2.15E-02	3.60E+00	0.00E+00	3.62E+00	0.00E+00	3.86E-01	4.01E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.40E+00	0.00E+00	8.66E-03	1.26E-01	0.00E+00	1.34E-01	0.00E+00	1.23E-02	1.47E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.80E+01	2.20E-03	1.03E-03	7.99E-02	0.00E+00	8.10E-02	2.58E-04	1.59E-01	2.40E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.29E+02	0.00E+00	8.38E-01	4.45E+01	0.00E+00	4.54E+01	0.00E+00	1.14E+00	4.65E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-02	1.32E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	7.83E-04	1.68E-01	0.00E+00	1.69E-01	0.00E+00	8.81E-03	1.78E-01				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.69E-01	0.00E+00	8.81E-03	1.78E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.26E-05	2.59E-01	0.00E+00	2.59E-01	0.00E+00	3.96E-04	2.59E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	3.73E-04	4.25E-02	0.00E+00	4.29E-02	0.00E+00	3.44E-04	4.32E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H10-4
Screening-Level Exposure Evaluation - American Woodcock
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-5
Screening-Level Exposure Evaluation - Belted Kingfisher
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-01	0.00E+00	2.54E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	2.95E+02	2.09E-01	1.31E+01	0.00E+00	1.31E+01	3.29E-02	0.00E+00	1.31E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	1.00E+00	0.00E+00	2.63E-03	0.00E+00	2.63E-03	0.00E+00	0.00E+00	2.63E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-01	0.00E+00	5.91E-01	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	4.38E+01	0.00E+00	9.25E-02	0.00E+00	9.25E-02	0.00E+00	0.00E+00	9.25E-02	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.80E+01	2.20E-03	7.09E-02	0.00E+00	7.09E-02	3.47E-04	0.00E+00	7.13E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.29E+02	0.00E+00	1.71E+00	0.00E+00	1.71E+00	0.00E+00	0.00E+00	1.71E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	7.50E-02	0.00E+00	5.41E-03	0.00E+00	5.41E-03	0.00E+00	0.00E+00	5.41E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.40E-01	0.00E+00	9.65E-03	0.00E+00	9.65E-03	0.00E+00	0.00E+00	9.65E-03				
Fluoranthene	1.80E+00	0.00E+00	1.18E-01	0.00E+00	1.18E-01	0.00E+00	0.00E+00	1.18E-01				
Fluorene	5.30E-02	0.00E+00	3.76E-03	0.00E+00	3.76E-03	0.00E+00	0.00E+00	3.76E-03				
Naphthalene	4.50E-02	0.00E+00	3.44E-03	0.00E+00	3.44E-03	0.00E+00	0.00E+00	3.44E-03				
Phenanthrene	8.10E-01	0.00E+00	5.56E-02	0.00E+00	5.56E-02	0.00E+00	0.00E+00	5.56E-02				
Total LMW PAHs					1.96E-01	0.00E+00	0.00E+00	1.96E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.00E+00	0.00E+00	5.69E-02	0.00E+00	5.69E-02	0.00E+00	0.00E+00	5.69E-02				
Benzo[A]Pyrene	1.40E+00	0.00E+00	8.40E-02	0.00E+00	8.40E-02	0.00E+00	0.00E+00	8.40E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.30E+00	0.00E+00	7.53E-02	0.00E+00	7.53E-02	0.00E+00	0.00E+00	7.53E-02				
Benzo(k)fluoranthene	7.50E-01	0.00E+00	4.43E-02	0.00E+00	4.43E-02	0.00E+00	0.00E+00	4.43E-02				
Chrysene	1.40E+00	0.00E+00	8.70E-02	0.00E+00	8.70E-02	0.00E+00	0.00E+00	8.70E-02				
Dibenz(A,H)Anthracene	2.80E-01	0.00E+00	1.59E-02	0.00E+00	1.59E-02	0.00E+00	0.00E+00	1.59E-02				
Indeno (1,2,3-CD) Pyrene	1.30E+00	0.00E+00	7.40E-02	0.00E+00	7.40E-02	0.00E+00	0.00E+00	7.40E-02				
Pyrene	1.50E+00	0.00E+00	9.99E-02	0.00E+00	9.99E-02	0.00E+00	0.00E+00	9.99E-02				
Total HMW PAHs					5.37E-01	0.00E+00	0.00E+00	5.37E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H10-5
Screening-Level Exposure Evaluation - Belted Kingfisher
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-6
Screening-Level Exposure Evaluation - Mourning Dove
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-01	0.00E+00	1.84E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	7.80E+00	0.00E+00	3.34E-02	0.00E+00	0.00E+00	3.34E-02	0.00E+00	6.05E-02	9.39E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	2.09E-01	5.25E+00	0.00E+00	0.00E+00	5.25E+00	2.39E-02	2.29E+00	7.57E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.78E+01	0.00E+00	8.25E-01	0.00E+00	0.00E+00	8.25E-01	0.00E+00	2.16E-01	1.04E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	0.00E+00	1.55E-01	0.00E+00	0.00E+00	1.55E-01	0.00E+00	1.44E-01	2.99E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.64E+03	3.75E+00	1.48E+01	0.00E+00	0.00E+00	1.48E+01	4.28E-01	1.27E+01	2.79E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	4.38E+01	0.00E+00	2.09E-01	0.00E+00	0.00E+00	2.09E-01	0.00E+00	3.40E-01	5.49E-01	6.71E+00	<1	1.86E+01	<1
Selenium	1.40E+00	0.00E+00	8.41E-02	0.00E+00	0.00E+00	8.41E-02	0.00E+00	1.09E-02	9.50E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.80E+01	2.20E-03	9.96E-03	0.00E+00	0.00E+00	9.96E-03	2.51E-04	1.40E-01	1.50E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.29E+02	0.00E+00	8.14E+00	0.00E+00	0.00E+00	8.14E+00	0.00E+00	1.00E+00	9.14E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-02	1.16E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	7.61E-03	0.00E+00	0.00E+00	7.61E-03	0.00E+00	7.76E-03	1.54E-02				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						7.61E-03	0.00E+00	7.76E-03	1.54E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.22E-04	0.00E+00	0.00E+00	1.22E-04	0.00E+00	3.49E-04	4.71E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	3.62E-03	0.00E+00	0.00E+00	3.62E-03	0.00E+00	3.03E-04	3.93E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H10-6
Screening-Level Exposure Evaluation - Mourning Dove
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-01	0.00E+00	1.32E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	7.80E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-03	3.46E-03	0.00E+00	1.66E-02	2.01E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	2.09E-01	0.00E+00	0.00E+00	1.65E-02	1.65E-02	1.71E-02	6.29E-01	6.63E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.78E+01	0.00E+00	0.00E+00	0.00E+00	1.02E+00	1.02E+00	0.00E+00	5.93E-02	1.08E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	0.00E+00	0.00E+00	0.00E+00	3.22E-01	3.22E-01	0.00E+00	3.94E-02	3.61E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	2.76E+00	2.76E+00	3.08E-01	3.50E+00	6.56E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	0.00E+00	3.73E-01	3.73E-01	0.00E+00	9.34E-02	4.66E-01	6.71E+00	<1	1.86E+01	<1
Selenium	1.40E+00	0.00E+00	0.00E+00	0.00E+00	6.14E-02	6.14E-02	0.00E+00	2.99E-03	6.44E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	0.00E+00	1.82E-02	1.82E-02	1.80E-04	3.84E-02	5.67E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	0.00E+00	9.07E+00	9.07E+00	0.00E+00	2.75E-01	9.35E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-03	3.20E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-03	2.13E-03				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	2.13E-03	2.13E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	2.87E-03	2.87E-03	0.00E+00	9.60E-05	2.97E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	1.44E-03	1.44E-03	0.00E+00	8.32E-05	1.52E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H10-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H10-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-01	0.00E+00	2.55E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	7.80E+00	0.00E+00	0.00E+00	1.63E-01	0.00E+00	1.63E-01	0.00E+00	0.00E+00	1.63E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	2.09E-01	0.00E+00	4.25E+00	0.00E+00	4.25E+00	3.31E-02	0.00E+00	4.28E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.78E+01	0.00E+00	0.00E+00	2.27E+00	0.00E+00	2.27E+00	0.00E+00	0.00E+00	2.27E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	0.00E+00	0.00E+00	1.34E+00	0.00E+00	1.34E+00	0.00E+00	0.00E+00	1.34E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.64E+03	3.75E+00	0.00E+00	1.10E+01	0.00E+00	1.10E+01	5.94E-01	0.00E+00	1.16E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	5.39E+00	0.00E+00	5.39E+00	0.00E+00	0.00E+00	5.39E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.40E+00	0.00E+00	0.00E+00	1.88E-01	0.00E+00	1.88E-01	0.00E+00	0.00E+00	1.88E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	1.20E-01	0.00E+00	1.20E-01	3.48E-04	0.00E+00	1.20E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	6.67E+01	0.00E+00	6.67E+01	0.00E+00	0.00E+00	6.67E+01	6.61E+01	1.01E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	2.52E-01	0.00E+00	2.52E-01	0.00E+00	0.00E+00	2.52E-01				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	ND	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						2.52E-01	0.00E+00	0.00E+00	2.52E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	3.88E-01	0.00E+00	3.88E-01	0.00E+00	0.00E+00	3.88E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	6.37E-02	0.00E+00	6.37E-02	0.00E+00	0.00E+00	6.37E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H10-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:
special status species, decisions are made solely on the NOAEL-based HQs.

TRV, toxicity reference value

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H10-9
Screening-Level Exposure Evaluation - Canada Lynx
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-02	0.00E+00	5.03E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	7.80E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-03	1.32E-03	0.00E+00	6.82E-03	8.14E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	2.09E-01	0.00E+00	0.00E+00	6.29E-03	6.29E-03	6.53E-03	2.58E-01	2.71E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.78E+01	0.00E+00	0.00E+00	0.00E+00	3.89E-01	3.89E-01	0.00E+00	2.43E-02	4.13E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	0.00E+00	0.00E+00	0.00E+00	1.23E-01	1.23E-01	0.00E+00	1.62E-02	1.39E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	1.05E+00	1.05E+00	1.17E-01	1.43E+00	2.60E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	0.00E+00	1.42E-01	1.42E-01	0.00E+00	3.83E-02	1.80E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.40E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-02	2.34E-02	0.00E+00	1.22E-03	2.46E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	0.00E+00	6.92E-03	6.92E-03	6.87E-05	1.57E-02	2.27E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	0.00E+00	3.46E+00	3.46E+00	0.00E+00	1.13E-01	3.57E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-03	1.31E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.75E-04	8.75E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	8.75E-04	8.75E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	1.10E-03	1.10E-03	0.00E+00	3.94E-05	1.13E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	5.47E-04	5.47E-04	0.00E+00	3.41E-05	5.81E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-9
Screening-Level Exposure Evaluation - Canada Lynx
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: special status species, decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-10
Screening-Level Exposure Evaluation - Grizzly Bear
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-02	0.00E+00	3.48E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	7.80E+00	0.00E+00	4.11E-03	3.34E-03	9.11E-05	0.00E+00	7.53E-03	0.00E+00	4.72E-03	7.53E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	2.09E-01	6.46E-01	8.70E-02	4.35E-04	0.00E+00	7.33E-01	4.51E-03	1.78E-01	7.38E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.78E+01	0.00E+00	1.01E-01	4.64E-02	2.69E-02	0.00E+00	1.75E-01	0.00E+00	1.68E-02	1.75E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	0.00E+00	1.91E-02	2.74E-02	8.47E-03	0.00E+00	5.50E-02	0.00E+00	1.12E-02	5.50E-02	4.70E+00	<1	1.86E+02	<1
Manganese	1.64E+03	3.75E+00	1.82E+00	2.25E-01	7.26E-02	0.00E+00	2.12E+00	8.10E-02	9.92E-01	2.20E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	2.57E-02	1.10E-01	9.82E-03	0.00E+00	1.46E-01	0.00E+00	2.65E-02	1.46E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.40E+00	0.00E+00	1.03E-02	3.85E-03	1.62E-03	0.00E+00	1.58E-02	0.00E+00	8.47E-04	1.58E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	1.23E-03	2.45E-03	4.78E-04	0.00E+00	4.15E-03	4.75E-05	1.09E-02	4.20E-03	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	1.00E+00	1.36E+00	2.39E-01	0.00E+00	2.60E+00	0.00E+00	7.80E-02	2.60E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.07E-04	0.00E+00	6.87E+01	--	6.87E+02	--
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:												--		
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												--		
Benzo(a)anthracene	1.00E+00	0.00E+00	9.36E-04	5.15E-03	0.00E+00	0.00E+00	6.09E-03	0.00E+00	6.05E-04	6.09E-03				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs							6.09E-03	0.00E+00	6.05E-04	6.69E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.50E-05	7.93E-03	7.57E-05	0.00E+00	8.02E-03	0.00E+00	2.72E-05	8.02E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	4.46E-04	1.30E-03	3.78E-05	0.00E+00	1.79E-03	0.00E+00	2.36E-05	1.79E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-10
Screening-Level Exposure Evaluation - Grizzly Bear
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

special status species, decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H10-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.29E-02	0.00E+00	8.29E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	7.80E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-03	2.17E-03	0.00E+00	6.42E-03	8.59E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	2.09E-01	0.00E+00	0.00E+00	1.04E-02	1.04E-02	1.08E-02	2.43E-01	2.64E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.78E+01	0.00E+00	0.00E+00	0.00E+00	6.41E-01	6.41E-01	0.00E+00	2.29E-02	6.64E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	0.00E+00	0.00E+00	0.00E+00	2.02E-01	2.02E-01	0.00E+00	1.52E-02	2.17E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	1.73E+00	1.73E+00	1.93E-01	1.35E+00	3.27E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	0.00E+00	2.34E-01	2.34E-01	0.00E+00	3.61E-02	2.70E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.40E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-02	3.85E-02	0.00E+00	1.15E-03	3.97E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	0.00E+00	1.14E-02	1.14E-02	1.13E-04	1.48E-02	2.63E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	0.00E+00	5.69E+00	5.69E+00	0.00E+00	1.06E-01	5.80E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-03	1.24E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.23E-04	8.23E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	8.23E-04	8.23E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	1.80E-03	1.80E-03	0.00E+00	3.71E-05	1.84E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	9.01E-04	9.01E-04	0.00E+00	3.21E-05	9.33E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-12
Screening-Level Exposure Evaluation - Meadow Vole
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-01	0.00E+00	2.42E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	7.80E+00	0.00E+00	4.40E-02	0.00E+00	0.00E+00	4.40E-02	0.00E+00	1.52E-02	5.92E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	2.09E-01	6.91E+00	0.00E+00	0.00E+00	6.91E+00	3.14E-02	5.76E-01	7.52E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.78E+01	0.00E+00	1.09E+00	0.00E+00	0.00E+00	1.09E+00	0.00E+00	5.43E-02	1.14E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	0.00E+00	2.05E-01	0.00E+00	0.00E+00	2.05E-01	0.00E+00	3.61E-02	2.41E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.64E+03	3.75E+00	1.95E+01	0.00E+00	0.00E+00	1.95E+01	5.63E-01	3.20E+00	2.32E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	2.75E-01	0.00E+00	0.00E+00	2.75E-01	0.00E+00	8.55E-02	3.60E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.40E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01	0.00E+00	2.73E-03	1.13E-01	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	1.31E-02	0.00E+00	0.00E+00	1.31E-02	3.31E-04	3.52E-02	4.86E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	1.07E+01	0.00E+00	0.00E+00	1.07E+01	0.00E+00	2.52E-01	1.10E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-03	2.93E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	1.00E-02	0.00E+00	0.00E+00	1.00E-02	0.00E+00	1.95E-03	1.20E-02				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.00E-02	0.00E+00	1.95E-03	1.20E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.61E-04	0.00E+00	0.00E+00	1.61E-04	0.00E+00	8.79E-05	2.49E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	4.77E-03	0.00E+00	0.00E+00	4.77E-03	0.00E+00	7.62E-05	4.85E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-12
Screening-Level Exposure Evaluation - Meadow Vole
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-13
Screening-Level Exposure Evaluation - Mink
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	6.96E-02	0.00E+00	6.96E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	2.95E+02	2.09E-01	0.00E+00	0.00E+00	0.00E+00	9.04E-03	0.00E+00	9.04E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-01	0.00E+00	1.62E-01	5.15E+01	<1	1.46E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	0.00E+00	0.00E+00	9.51E-05	0.00E+00	9.51E-05	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E+01	--	6.87E+02	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	7.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	1.80E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	5.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	4.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	8.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(A)Pyrene	1.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(k)fluoranthene	7.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	1.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Dibenz(A,H)Anthracene	2.80E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Pyrene	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total HMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-13
Screening-Level Exposure Evaluation - Mink
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-14
Screening-Level Exposure Evaluation - North American Wolverine
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.84E-02	0.00E+00	4.84E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	7.80E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-03	1.27E-03	0.00E+00	6.56E-03	7.83E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	2.09E-01	0.00E+00	0.00E+00	6.05E-03	6.05E-03	6.28E-03	2.48E-01	2.61E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.78E+01	0.00E+00	0.00E+00	0.00E+00	3.74E-01	3.74E-01	0.00E+00	2.34E-02	3.98E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	0.00E+00	0.00E+00	0.00E+00	1.18E-01	1.18E-01	0.00E+00	1.56E-02	1.33E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.64E+03	3.75E+00	0.00E+00	0.00E+00	1.01E+00	1.01E+00	1.13E-01	1.38E+00	2.50E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	0.00E+00	1.37E-01	1.37E-01	0.00E+00	3.68E-02	1.73E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.40E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-02	2.25E-02	0.00E+00	1.18E-03	2.37E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	0.00E+00	6.65E-03	6.65E-03	6.61E-05	1.51E-02	2.19E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	0.00E+00	3.32E+00	3.32E+00	0.00E+00	1.09E-01	3.43E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-03	1.26E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.41E-04	8.41E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	8.41E-04	8.41E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	1.05E-03	1.05E-03	0.00E+00	3.79E-05	1.09E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	5.26E-04	5.26E-04	0.00E+00	3.28E-05	5.59E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-14
Screening-Level Exposure Evaluation - North American Wolverine
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: special status species, decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where: ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF_i = Dietary fraction of food item i (proportion of food type in the diet)
AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW = Body weight of the receptor, wet weight (kg)
ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H10-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-01	0.00E+00	2.16E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	7.80E+00	0.00E+00	0.00E+00	1.38E-01	0.00E+00	1.38E-01	0.00E+00	1.15E-02	1.49E-01	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	2.09E-01	0.00E+00	3.60E+00	0.00E+00	3.60E+00	2.80E-02	4.35E-01	4.06E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.78E+01	0.00E+00	0.00E+00	1.92E+00	0.00E+00	1.92E+00	0.00E+00	4.10E-02	1.96E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	0.00E+00	0.00E+00	1.14E+00	0.00E+00	1.14E+00	0.00E+00	2.73E-02	1.16E+00	4.70E+00	<1	1.86E+02	<1
Manganese	1.64E+03	3.75E+00	0.00E+00	9.30E+00	0.00E+00	9.30E+00	5.03E-01	2.42E+00	1.22E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	4.38E+01	0.00E+00	0.00E+00	4.57E+00	0.00E+00	4.57E+00	0.00E+00	6.46E-02	4.63E+00	1.70E+00	2.72E+00	1.48E+01	<1
Selenium	1.40E+00	0.00E+00	0.00E+00	1.59E-01	0.00E+00	1.59E-01	0.00E+00	2.06E-03	1.61E-01	1.43E-01	1.13E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.80E+01	2.20E-03	0.00E+00	1.01E-01	0.00E+00	1.01E-01	2.95E-04	2.65E-02	1.28E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.29E+02	0.00E+00	0.00E+00	5.64E+01	0.00E+00	5.64E+01	0.00E+00	1.90E-01	5.66E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-03	2.21E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	ND	--	0.00E+00	0.00E+00	--	0.00E+00			
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.00E+00	0.00E+00	0.00E+00	2.13E-01	0.00E+00	2.13E-01	0.00E+00	1.47E-03	2.15E-01				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	ND	--	0.00E+00	0.00E+00	--	0.00E+00			
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						2.13E-01	0.00E+00	1.47E-03	2.15E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	3.28E-01	0.00E+00	3.28E-01	0.00E+00	6.63E-05	3.28E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	5.39E-02	0.00E+00	5.39E-02	0.00E+00	5.75E-05	5.40E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H10-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	1.45E+01	3.75E-02	5.44E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.60E+00	Sample et al. (1999)	Regression ^f	7.01E-02	Sample et al. (1998b)
Barium	NA	9.05E+02	1.56E-01	1.41E+02	Bechtel-Jacobs (1998a) ^g	9.10E-02	8.24E+01	Sample et al. (1998a)	6.83E-04	6.18E-01	Baes et al. (1984) ^e
Beryllium	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	4.25E+01	Regression ^a	8.54E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.19E+01	Sample et al. (1998a)	Regression ^f	1.32E+01	Sample et al. (1998b)
Lead	NA	1.76E+01	Regression ^a	1.32E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.14E+00	Sample et al. (1999)	Regression ^f	3.84E+00	Sample et al. (1998b)
Manganese	NA	9.88E+02	7.90E-02	7.81E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	4.91E+01	Sample et al. (1999)	2.05E-02	2.03E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	4.40E+00	Regression ^a	2.61E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.75E+00	Sample et al. (1998a)	Regression ^f	1.15E+00	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a) ^m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.72E+01	4.85E-03	8.34E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.22E-01	Sample et al. (1998a)	1.23E-02	2.12E-01	Sample et al. (1998b) ⁱ
Zinc	NA	6.53E+01	Regression ^a	4.89E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.37E+02	Sample et al. (1998a)	Regression ^f	1.05E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	8.40E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j

Table H11-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											

Table H11-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8,9-HxCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H11-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H11-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	1.45E+01	3.75E-02	5.44E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.60E+00	Sample et al. (1999)	Regression ^f	7.01E-02	Sample et al. (1998b)
Barium	NA	9.05E+02	1.56E-01	1.41E+02	Bechtel-Jacobs (1998a) ^g	9.10E-02	8.24E+01	Sample et al. (1998a)	6.83E-04	6.18E-01	Baes et al. (1984) ^e
Beryllium	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	4.25E+01	Regression ^a	8.54E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.19E+01	Sample et al. (1998a)	Regression ^f	1.32E+01	Sample et al. (1998b)
Lead	NA	1.76E+01	Regression ^a	1.32E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.14E+00	Sample et al. (1999)	Regression ^f	3.84E+00	Sample et al. (1998b)
Manganese	NA	9.88E+02	7.90E-02	7.81E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	4.91E+01	Sample et al. (1999)	2.05E-02	2.03E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	4.40E+00	Regression ^a	2.61E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.75E+00	Sample et al. (1998a)	Regression ^f	1.15E+00	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.72E+01	4.85E-03	8.34E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	7.22E-01	Sample et al. (1998a)	1.23E-02	2.12E-01	Sample et al. (1998b) ⁱ
Zinc	NA	6.53E+01	Regression ^a	4.89E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.37E+02	Sample et al. (1998a)	Regression ^f	1.05E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	8.40E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H11-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H11-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H11-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H11-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	5.75E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	1.45E+01	NA	3.73E-01	---	5.41E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	2.45E-01	9.05E+02	NA	2.82E+00	---	2.55E+03	Hamilton et al. (2002)
Beryllium	NA	0.00E+00	1.10E+00	NA	1.67E-01	---	1.84E-01	Hamilton et al. (2002)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	0.00E+00	4.25E+01	NA	6.61E-01	---	2.81E+01	Bechtel-Jacobs (1998b) ^c
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Manganese		1.27E-01	9.88E+02					
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	0.00E+00	0.00E+00	NA	1.34E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	4.40E+00	NA	3.75E+00	---	1.65E+01	Hamilton et al. (2002)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)
Vanadium	NA	3.90E-03	1.72E+01	NA	2.50E-01	---	4.30E+00	Hamilton and Buhl (2002)
Zinc	NA	0.00E+00	0.00E+00	NA	8.40E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	0.00E+00	8.40E-01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aquirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	3.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	3.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	0.00E+00	7.04E-01	4.58E+00	---	0.00E+00	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	1.30E-02	6.73E-01	4.37E+00	---	5.68E-02	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	1.50E-01	6.41E-01	4.17E+00	---	6.25E-01	DiToro and McGrath (2000)

Table H11-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	0.00E+00	6.92E-01	4.50E+00	---	0.00E+00	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	8.50E-02	6.70E-01	4.36E+00	---	3.70E-01	DiToro and McGrath (2000)
Total LMW PAHs							1.05E+00	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	0.00E+00	7.40E-02	5.56E-01	3.61E+00	---	2.67E-01	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	9.10E-02	5.86E-01	3.81E+00	---	3.47E-01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	1.00E-01	5.66E-01	3.68E+00	---	3.68E-01	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	0.00E+00	5.77E-01	3.75E+00	---	0.00E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	2.00E-01	6.07E-01	3.94E+00	---	7.89E-01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	2.10E-02	5.56E-01	3.61E+00	---	7.59E-02	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	9.30E-02	5.55E-01	3.61E+00	---	3.36E-01	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.20E-01	6.50E-01	4.23E+00	---	5.07E-01	DiToro and McGrath (2000)
Total HMW PAHs							2.69E+00	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					

Table H11-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H11-3
Screening-Level Exposure Evaluation - American Dipper
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-01	0.00E+00	9.54E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	1.45E+01	0.00E+00	8.97E-01	0.00E+00	8.97E-01	0.00E+00	4.81E-02	9.46E-01	2.24E+00	<1	4.51E+00	<1
Barium	9.05E+02	2.45E-01	4.23E+02	0.00E+00	4.23E+02	4.07E-02	3.00E+00	4.27E+02	7.35E+01	5.80E+00	1.31E+02	3.26E+00
Beryllium	1.10E+00	0.00E+00	3.05E-02	0.00E+00	3.05E-02	0.00E+00	3.65E-03	3.41E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.25E+01	0.00E+00	4.66E+00	0.00E+00	4.66E+00	0.00E+00	1.41E-01	4.80E+00	4.05E+00	1.19E+00	3.48E+01	<1
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	0.00E+00	2.11E-02	3.28E+00	3.30E+00	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	4.40E+00	0.00E+00	2.74E+00	0.00E+00	2.74E+00	0.00E+00	1.46E-02	2.75E+00	2.90E-01	9.49E+00	8.20E-01	3.36E+00
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.72E+01	3.90E-03	7.13E-01	0.00E+00	7.13E-01	6.47E-04	5.71E-02	7.71E-01	3.44E-01	2.24E+00	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-03	2.79E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.30E-02	0.00E+00	9.43E-03	0.00E+00	9.43E-03	0.00E+00	0.00E+00	4.31E-05	9.48E-03			
Fluoranthene	1.50E-01	0.00E+00	1.04E-01	0.00E+00	1.04E-01	0.00E+00	4.98E-04	1.04E-01				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	8.50E-02	0.00E+00	6.15E-02	0.00E+00	6.15E-02	0.00E+00	2.82E-04	6.17E-02				
Total LMW PAHs					1.75E-01	0.00E+00	8.23E-04	1.75E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.40E-02	0.00E+00	4.44E-02	0.00E+00	4.44E-02	0.00E+00	2.46E-04	4.46E-02				
Benzo[A]Pyrene	9.10E-02	0.00E+00	5.75E-02	0.00E+00	5.75E-02	0.00E+00	3.02E-04	5.78E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.00E-01	0.00E+00	6.10E-02	0.00E+00	6.10E-02	0.00E+00	3.32E-04	6.13E-02				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	2.00E-01	0.00E+00	1.31E-01	0.00E+00	1.31E-01	0.00E+00	6.64E-04	1.32E-01				
Dibenz(A,H)Anthracene	2.10E-02	0.00E+00	1.26E-02	0.00E+00	1.26E-02	0.00E+00	6.97E-05	1.27E-02				
Indeno (1,2,3-CD) Pyrene	9.30E-02	0.00E+00	5.57E-02	0.00E+00	5.57E-02	0.00E+00	3.09E-04	5.60E-02				
Pyrene	1.20E-01	0.00E+00	8.42E-02	0.00E+00	8.42E-02	0.00E+00	3.98E-04	8.45E-02				
Total HMW PAHs					4.46E-01	0.00E+00	2.32E-03	4.49E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H11-3
Screening-Level Exposure Evaluation - American Dipper
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-4
Screening-Level Exposure Evaluation - American Woodcock
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.76E-01	0.00E+00	6.76E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	1.45E+01	0.00E+00	6.39E-03	1.69E-01	0.00E+00	1.75E-01	0.00E+00	1.28E-01	3.03E-01	2.24E+00	<1	4.51E+00	<1
Barium	9.05E+02	2.45E-01	1.66E+00	8.71E+00	0.00E+00	1.04E+01	2.88E-02	7.97E+00	1.84E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.25E+01	0.00E+00	1.00E-01	2.31E+00	0.00E+00	2.41E+00	0.00E+00	3.74E-01	2.79E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.76E+01	0.00E+00	1.56E-02	8.60E-01	0.00E+00	8.76E-01	0.00E+00	1.55E-01	1.03E+00	1.63E+00	<1	4.46E+01	<1
Manganese	9.88E+02	1.27E-01	9.17E-01	5.19E+00	0.00E+00	6.11E+00	1.49E-02	8.71E+00	1.48E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	4.40E+00	0.00E+00	3.06E-02	2.91E-01	0.00E+00	3.21E-01	0.00E+00	3.88E-02	3.60E-01	2.90E-01	1.24E+00	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.72E+01	3.90E-03	9.80E-04	7.64E-02	0.00E+00	7.74E-02	4.58E-04	1.52E-01	2.29E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.53E+01	0.00E+00	5.75E-01	3.56E+01	0.00E+00	3.62E+01	0.00E+00	5.75E-01	3.68E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.40E-03	7.40E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H11-4
Screening-Level Exposure Evaluation - American Woodcock
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-5
Screening-Level Exposure Evaluation - Belted Kingfisher
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-01	0.00E+00	9.06E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	1.45E+01	0.00E+00	8.52E-02	0.00E+00	8.52E-02	0.00E+00	0.00E+00	8.52E-02	2.24E+00	<1	4.51E+00	<1
Barium	9.05E+02	2.45E-01	4.02E+01	0.00E+00	4.02E+01	3.86E-02	0.00E+00	4.03E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	1.10E+00	0.00E+00	2.89E-03	0.00E+00	2.89E-03	0.00E+00	0.00E+00	2.89E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.25E+01	0.00E+00	4.43E-01	0.00E+00	4.43E-01	0.00E+00	0.00E+00	4.43E-01	4.05E+00	<1	3.48E+01	<1
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	0.00E+00	2.00E-02	0.00E+00	2.00E-02	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	4.40E+00	0.00E+00	2.60E-01	0.00E+00	2.60E-01	0.00E+00	0.00E+00	2.60E-01	2.90E-01	<1	8.20E-01	<1
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.72E+01	3.90E-03	6.78E-02	0.00E+00	6.78E-02	6.15E-04	0.00E+00	6.84E-02	3.44E-01	<1	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.30E-02	0.00E+00	8.96E-04	0.00E+00	8.96E-04	0.00E+00	0.00E+00	8.96E-04				
Fluoranthene	1.50E-01	0.00E+00	9.85E-03	0.00E+00	9.85E-03	0.00E+00	0.00E+00	9.85E-03				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	8.50E-02	0.00E+00	5.84E-03	0.00E+00	5.84E-03	0.00E+00	0.00E+00	5.84E-03				
Total LMW PAHs					1.66E-02	0.00E+00	0.00E+00	1.66E-02	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.40E-02	0.00E+00	4.21E-03	0.00E+00	4.21E-03	0.00E+00	0.00E+00	4.21E-03				
Benzo[A]Pyrene	9.10E-02	0.00E+00	5.46E-03	0.00E+00	5.46E-03	0.00E+00	0.00E+00	5.46E-03				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.00E-01	0.00E+00	5.80E-03	0.00E+00	5.80E-03	0.00E+00	0.00E+00	5.80E-03				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	2.00E-01	0.00E+00	1.24E-02	0.00E+00	1.24E-02	0.00E+00	0.00E+00	1.24E-02				
Dibenz(A,H)Anthracene	2.10E-02	0.00E+00	1.20E-03	0.00E+00	1.20E-03	0.00E+00	0.00E+00	1.20E-03				
Indeno (1,2,3-CD) Pyrene	9.30E-02	0.00E+00	5.29E-03	0.00E+00	5.29E-03	0.00E+00	0.00E+00	5.29E-03				
Pyrene	1.20E-01	0.00E+00	7.99E-03	0.00E+00	7.99E-03	0.00E+00	0.00E+00	7.99E-03				
Total HMW PAHs					4.24E-02	0.00E+00	0.00E+00	4.24E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H11-5
Screening-Level Exposure Evaluation - Belted Kingfisher
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-6
Screening-Level Exposure Evaluation - Mourning Dove
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-01	0.00E+00	6.56E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	1.45E+01	0.00E+00	6.21E-02	0.00E+00	0.00E+00	6.21E-02	0.00E+00	1.13E-01	1.75E-01	2.24E+00	<1	4.51E+00	<1
Barium	9.05E+02	2.45E-01	1.61E+01	0.00E+00	0.00E+00	1.61E+01	2.80E-02	7.02E+00	2.32E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.25E+01	0.00E+00	9.75E-01	0.00E+00	0.00E+00	9.75E-01	0.00E+00	3.30E-01	1.31E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.76E+01	0.00E+00	1.51E-01	0.00E+00	0.00E+00	1.51E-01	0.00E+00	1.37E-01	2.88E-01	1.63E+00	<1	4.46E+01	<1
Manganese	9.88E+02	1.27E-01	8.91E+00	0.00E+00	0.00E+00	8.91E+00	1.45E-02	7.67E+00	1.66E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	4.40E+00	0.00E+00	2.98E-01	0.00E+00	0.00E+00	2.98E-01	0.00E+00	3.42E-02	3.32E-01	2.90E-01	1.14E+00	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.72E+01	3.90E-03	9.52E-03	0.00E+00	0.00E+00	9.52E-03	4.45E-04	1.33E-01	1.43E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.53E+01	0.00E+00	5.58E+00	0.00E+00	0.00E+00	5.58E+00	0.00E+00	5.07E-01	6.09E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.52E-03	6.52E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H11-6
Screening-Level Exposure Evaluation - Mourning Dove
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
- IR_{diet}

= Ingestion rate of food (kg food ingested per day, dry weight)
- B(S)AF

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
- DF_i

= Dietary fraction of food item i (proportion of food type in the diet)
- AUF

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
- BW

= Body weight of the receptor, wet weight (kg)
- ADD_{substrate}

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
- IR_s

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
- C_{substrate}

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-01	0.00E+00	4.72E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	0.00E+00	5.75E-03	5.75E-03	0.00E+00	3.09E-02	3.67E-02	2.24E+00	<1	4.51E+00	<1
Barium	9.05E+02	2.45E-01	0.00E+00	0.00E+00	5.07E-02	5.07E-02	2.01E-02	1.93E+00	2.00E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	0.00E+00	1.09E+00	1.09E+00	0.00E+00	9.06E-02	1.18E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.76E+01	0.00E+00	0.00E+00	0.00E+00	3.15E-01	3.15E-01	0.00E+00	3.75E-02	3.52E-01	1.63E+00	<1	4.46E+01	<1
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	1.66E+00	1.66E+00	1.04E-02	2.11E+00	3.78E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	0.00E+00	9.45E-02	9.45E-02	0.00E+00	9.38E-03	1.04E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	0.00E+00	1.74E-02	1.74E-02	3.20E-04	3.67E-02	5.43E-02	3.44E-01	<1	1.70E+00	<1
Zinc	6.53E+01	0.00E+00	0.00E+00	0.00E+00	8.65E+00	8.65E+00	0.00E+00	1.39E-01	8.79E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-03	1.79E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H11-7
Screening-Level Exposure Evaluation - Red-tailed Hawk
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-01	0.00E+00	9.10E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	2.53E-01	0.00E+00	2.53E-01	0.00E+00	0.00E+00	2.53E-01	2.24E+00	<1	4.51E+00	<1
Barium	9.05E+02	2.45E-01	0.00E+00	1.30E+01	0.00E+00	1.30E+01	3.88E-02	0.00E+00	1.31E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	3.47E+00	0.00E+00	3.47E+00	0.00E+00	0.00E+00	3.47E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.76E+01	0.00E+00	0.00E+00	1.29E+00	0.00E+00	1.29E+00	0.00E+00	0.00E+00	1.29E+00	1.63E+00	<1	4.46E+01	<1
Manganese	9.88E+02	1.27E-01	0.00E+00	7.77E+00	0.00E+00	7.77E+00	2.01E-02	0.00E+00	7.79E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	4.35E-01	0.00E+00	4.35E-01	0.00E+00	0.00E+00	4.35E-01	2.90E-01	1.50E+00	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	1.14E-01	0.00E+00	1.14E-01	6.17E-04	0.00E+00	1.15E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.53E+01	0.00E+00	0.00E+00	5.33E+01	0.00E+00	5.33E+01	0.00E+00	0.00E+00	5.33E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H11-8
Screening-Level Exposure Evaluation - Yellow-billed Cuckoo
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-9
Screening-Level Exposure Evaluation - Canada Lynx
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	0.00E+00	1.80E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	0.00E+00	2.19E-03	2.19E-03	0.00E+00	1.27E-02	1.49E-02	1.04E+00	<1	4.55E+00	<1
Barium	9.05E+02	2.45E-01	0.00E+00	0.00E+00	1.93E-02	1.93E-02	7.65E-03	7.92E-01	8.19E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	0.00E+00	4.14E-01	4.14E-01	0.00E+00	3.72E-02	4.51E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.76E+01	0.00E+00	0.00E+00	0.00E+00	1.20E-01	1.20E-01	0.00E+00	1.54E-02	1.35E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	6.33E-01	6.33E-01	3.97E-03	8.64E-01	1.50E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-02	3.60E-02	0.00E+00	3.85E-03	3.99E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	0.00E+00	6.61E-03	6.61E-03	1.22E-04	1.50E-02	2.18E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.53E+01	0.00E+00	0.00E+00	0.00E+00	3.29E+00	3.29E+00	0.00E+00	5.71E-02	3.35E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-04	7.35E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-9
Screening-Level Exposure Evaluation - Canada Lynx
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-10
Screening-Level Exposure Evaluation - Grizzly Bear
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-01	0.00E+00	1.24E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	7.64E-03	5.17E-03	1.51E-04	0.00E+00	1.30E-02	0.00E+00	8.77E-03	1.30E-02	1.04E+00	<1	4.55E+00	<1
Barium	9.05E+02	2.45E-01	1.98E+00	2.67E-01	1.33E-03	0.00E+00	2.25E+00	5.29E-03	5.47E-01	2.26E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	1.20E-01	7.09E-02	2.86E-02	0.00E+00	2.19E-01	0.00E+00	2.57E-02	2.19E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.76E+01	0.00E+00	1.86E-02	2.64E-02	8.28E-03	0.00E+00	5.32E-02	0.00E+00	1.06E-02	5.32E-02	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+02	1.27E-01	1.10E+00	1.59E-01	4.37E-02	0.00E+00	1.30E+00	2.74E-03	5.97E-01	1.30E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	3.66E-02	8.90E-03	2.49E-03	0.00E+00	4.80E-02	0.00E+00	2.66E-03	4.80E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	1.17E-03	2.34E-03	4.57E-04	0.00E+00	3.97E-03	8.42E-05	1.04E-02	4.05E-03	4.16E+00	<1	9.44E+00	<1
Zinc	6.53E+01	0.00E+00	6.87E-01	1.09E+00	2.28E-01	0.00E+00	2.01E+00	0.00E+00	3.95E-02	2.01E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.08E-04	0.00E+00	6.87E+01	--	6.87E+02	--
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-10
Screening-Level Exposure Evaluation - Grizzly Bear
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Shallow Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-01	0.00E+00	2.96E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	0.00E+00	3.61E-03	3.61E-03	0.00E+00	1.19E-02	1.55E-02	1.04E+00	<1	4.55E+00	<1
Barium	9.05E+02	2.45E-01	0.00E+00	0.00E+00	3.18E-02	3.18E-02	1.26E-02	7.45E-01	7.90E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	0.00E+00	6.81E-01	6.81E-01	0.00E+00	3.50E-02	7.16E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.76E+01	0.00E+00	0.00E+00	0.00E+00	1.97E-01	1.97E-01	0.00E+00	1.45E-02	2.12E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	1.04E+00	1.04E+00	6.54E-03	8.14E-01	1.86E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-02	5.93E-02	0.00E+00	3.62E-03	6.29E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	0.00E+00	1.09E-02	1.09E-02	2.01E-04	1.42E-02	2.53E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.53E+01	0.00E+00	0.00E+00	0.00E+00	5.43E+00	5.43E+00	0.00E+00	5.38E-02	5.48E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.92E-04	6.92E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-11
Screening-Level Exposure Evaluation - Long-tailed Weasel
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-12
Screening-Level Exposure Evaluation - Meadow Vole
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.64E-01	0.00E+00	8.64E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	8.17E-02	0.00E+00	0.00E+00	8.17E-02	0.00E+00	2.83E-02	1.10E-01	1.04E+00	<1	4.55E+00	<1
Barium	9.05E+02	2.45E-01	2.12E+01	0.00E+00	0.00E+00	2.12E+01	3.68E-02	1.77E+00	2.30E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	1.28E+00	0.00E+00	0.00E+00	1.28E+00	0.00E+00	8.30E-02	1.37E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.76E+01	0.00E+00	1.99E-01	0.00E+00	0.00E+00	1.99E-01	0.00E+00	3.44E-02	2.33E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+02	1.27E-01	1.17E+01	0.00E+00	0.00E+00	1.17E+01	1.91E-02	1.93E+00	1.37E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	3.92E-01	0.00E+00	0.00E+00	3.92E-01	0.00E+00	8.59E-03	4.00E-01	1.43E-01	2.80E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	1.25E-02	0.00E+00	0.00E+00	1.25E-02	5.86E-04	3.36E-02	4.67E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.53E+01	0.00E+00	7.35E+00	0.00E+00	0.00E+00	7.35E+00	0.00E+00	1.28E-01	7.48E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-03	1.64E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-12
Screening-Level Exposure Evaluation - Meadow Vole
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-13
Screening-Level Exposure Evaluation - Mink
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-01	0.00E+00	2.49E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	9.05E+02	2.45E-01	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	1.06E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	0.00E+00	5.49E-03	0.00E+00	5.49E-03	5.15E+01	<1	1.46E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	0.00E+00	0.00E+00	1.69E-04	0.00E+00	1.69E-04	4.16E+00	<1	9.44E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E+01	--	6.87E+02	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	1.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	8.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo[A]Pyrene	9.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	2.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Dibenz(A,H)Anthracene	2.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	9.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Pyrene	1.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total HMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-13
Screening-Level Exposure Evaluation - Mink
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-14
Screening-Level Exposure Evaluation - North American Wolverine
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-01	0.00E+00	1.73E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	0.00E+00	2.11E-03	2.11E-03	0.00E+00	1.22E-02	1.43E-02	1.04E+00	<1	4.55E+00	<1
Barium	9.05E+02	2.45E-01	0.00E+00	0.00E+00	1.86E-02	1.86E-02	7.36E-03	7.61E-01	7.87E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	0.00E+00	3.98E-01	3.98E-01	0.00E+00	3.58E-02	4.34E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.76E+01	0.00E+00	0.00E+00	0.00E+00	1.15E-01	1.15E-01	0.00E+00	1.48E-02	1.30E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+02	1.27E-01	0.00E+00	0.00E+00	6.09E-01	6.09E-01	3.82E-03	8.31E-01	1.44E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-02	3.46E-02	0.00E+00	3.70E-03	3.83E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	0.00E+00	6.36E-03	6.36E-03	1.17E-04	1.45E-02	2.09E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.53E+01	0.00E+00	0.00E+00	0.00E+00	3.17E+00	3.17E+00	0.00E+00	5.49E-02	3.22E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.07E-04	7.07E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-14
Screening-Level Exposure Evaluation - North American Wolverine
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)											
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--	
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00					
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--	

Notes: signifies special status species, and decisions are made solely on the NOAEL-based HQs.

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

- where:
- ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
 - IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
 - B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
 - DF_i = Dietary fraction of food item i (proportion of food type in the diet)
 - AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
 - BW = Body weight of the receptor, wet weight (kg)
 - ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
 - IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
 - C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H11-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	5.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.71E-01	0.00E+00	7.71E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.45E+01	0.00E+00	0.00E+00	2.14E-01	0.00E+00	2.14E-01	0.00E+00	2.14E-02	2.35E-01	1.04E+00	<1	4.55E+00	<1
Barium	9.05E+02	2.45E-01	0.00E+00	1.10E+01	0.00E+00	1.10E+01	3.28E-02	1.33E+00	1.24E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.25E+01	0.00E+00	0.00E+00	2.93E+00	0.00E+00	2.93E+00	0.00E+00	6.27E-02	3.00E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.76E+01	0.00E+00	0.00E+00	1.09E+00	0.00E+00	1.09E+00	0.00E+00	2.59E-02	1.12E+00	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+02	1.27E-01	0.00E+00	6.58E+00	0.00E+00	6.58E+00	1.70E-02	1.46E+00	8.05E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	4.40E+00	0.00E+00	0.00E+00	3.68E-01	0.00E+00	3.68E-01	0.00E+00	6.49E-03	3.75E-01	1.43E-01	2.62E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.72E+01	3.90E-03	0.00E+00	9.68E-02	0.00E+00	9.68E-02	5.23E-04	2.54E-02	1.23E-01	4.16E+00	<1	9.44E+00	<1
Zinc	6.53E+01	0.00E+00	0.00E+00	4.51E+01	0.00E+00	4.51E+01	0.00E+00	9.63E-02	4.52E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-03	1.24E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H11-15
Screening-Level Exposure Evaluation - Short-tailed Shrew
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H12-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Metals												
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.96E+04	0.00E+00	Sample et al. (1996)
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.20E+01	0.00E+00	Sample et al. (1996)
Cobalt		0.00E+00	0.00E+00									
Copper	NA	0.00E+00	0.00E+00	NA	6.61E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.16E+03	0.00E+00	Sample et al. (1996)
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.80E+02	0.00E+00	Sample et al. (1996)
Manganese		2.12E-01	0.00E+00									
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c	---	1.92E+02	0.00E+00	DTSC (2000)
Nickel	NA	0.00E+00	0.00E+00	NA	1.34E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.24E+02	0.00E+00	Sample et al. (1996)
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)	---	1.04E+04	0.00E+00	Sample et al. (1996)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)	---	4.24E+02	0.00E+00	Laplace et al. (1992)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)	---	1.36E+02	0.00E+00	Sample et al. (1996)
Vanadium	NA	1.90E-03	2.55E+01	NA	2.50E-01	---	6.38E+00	Hamilton and Buhl (2002)	---	2.52E+03	4.79E+00	CECBP (2008)
Zinc	NA	0.00E+00	0.00E+00	NA	8.40E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	3.86E+03	0.00E+00	Sample et al. (1996)
Inorganics - Other Inorganics												
Cyanide	NA	3.78E-01	8.30E+00	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)	---	Regression	0.00E+00	Derived based on Shi et al. (2009)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	3.73E+00	---	0.00E+00	DiToro and McGrath (2000)	4.59E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	3.53E+00	---	0.00E+00	DiToro and McGrath (2000)	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	4.01	0.00E+00	3.30E-02	7.04E-01	4.58E+00	---	1.51E-01	DiToro and McGrath (2000)	5.63E+00	---	1.86E-01	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)	6.04E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	1.60E-01	6.73E-01	4.37E+00	---	7.00E-01	DiToro and McGrath (2000)	5.38E+00	---	8.61E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	6.50E+00	6.41E-01	4.17E+00	---	2.71E+01	DiToro and McGrath (2000)	5.13E+00	---	3.33E+01	DiToro and McGrath (2000)
Fluorene	4.21	0.00E+00	0.00E+00	6.92E-01	4.50E+00	---	0.00E+00	DiToro and McGrath (2000)	5.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	1.90E-02	7.45E-01	4.84E+00	---	9.20E-02	DiToro and McGrath (2000)	5.96E+00	---	1.13E-01	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	1.00E+00	6.70E-01	4.36E+00	---	4.36E+00	DiToro and McGrath (2000)	5.36E+00	---	5.36E+00	DiToro and McGrath (2000)
Total LMW PAHs							3.24E+01				3.99E+01	

Table H12-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	6.71	0.00E+00	2.10E+00	5.56E-01	3.61E+00	---	7.59E+00	DiToro and McGrath (2000)	4.45E+00	---	9.34E+00	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	8.70E-01	5.86E-01	3.81E+00	---	3.31E+00	DiToro and McGrath (2000)	4.69E+00	---	4.08E+00	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	7.00E-04	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)	4.62E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	1.20E+00	5.66E-01	3.68E+00	---	4.41E+00	DiToro and McGrath (2000)	4.53E+00	---	5.43E+00	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	1.90E+00	5.77E-01	3.75E+00	---	7.12E+00	DiToro and McGrath (2000)	4.61E+00	---	8.77E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	4.90E+00	6.07E-01	3.94E+00	---	1.93E+01	DiToro and McGrath (2000)	4.85E+00	---	2.38E+01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	4.10E-01	5.56E-01	3.61E+00	---	1.48E+00	DiToro and McGrath (2000)	4.45E+00	---	1.82E+00	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	1.50E+00	5.55E-01	3.61E+00	---	5.42E+00	DiToro and McGrath (2000)	4.44E+00	---	6.67E+00	DiToro and McGrath (2000)
Pyrene	4.92	1.60E-03	6.80E+00	6.50E-01	4.23E+00	---	2.87E+01	DiToro and McGrath (2000)	5.20E+00	---	3.54E+01	DiToro and McGrath (2000)
Total HMW PAHs							7.74E+01				9.53E+01	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00									
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)	5.59E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)	5.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)	5.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	2.20E-02	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)	3.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00									
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)	5.78E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)	5.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)	3.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)	4.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00									
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane		0.00E+00	0.00E+00									
Dioxin/Furans												
2,3,7,8-TCDD		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00									

Table H12-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00									
OCDD		0.00E+00	0.00E+00									
2,3,7,8-TCDF		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00									
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00									
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00									
OCDF		0.00E+00	0.00E+00									

Notes:
NA, Normalized BSAF was not applicable for metals
a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)
b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:
$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)
f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)
f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)
c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H12-2
Screening-Level Exposure Evaluation - American Dipper
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	1.54E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-01	0.00E+00	2.56E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	1.51E+02	2.16E-01	7.07E+01	0.00E+00	7.07E+01	3.58E-02	5.01E-01	7.12E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	5.70E-01	0.00E+00	1.58E-02	0.00E+00	1.58E-02	0.00E+00	1.89E-03	1.77E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	0.00E+00	2.12E-01	0.00E+00	0.00E+00	0.00E+00	3.52E-02	0.00E+00	3.52E-02	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	2.55E+01	1.90E-03	1.06E+00	0.00E+00	1.06E+00	3.15E-04	8.46E-02	1.14E+00	3.44E-01	3.32E+00	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	8.30E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	6.27E-02	2.75E-02	9.03E-02	4.00E-02	2.26E+00	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.30E-02	0.00E+00	2.51E-02	0.00E+00	2.51E-02	0.00E+00	1.10E-04	2.52E-02				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.60E-01	0.00E+00	1.16E-01	0.00E+00	1.16E-01	0.00E+00	5.31E-04	1.17E-01				
Fluoranthene	6.50E+00	0.00E+00	4.49E+00	0.00E+00	4.49E+00	0.00E+00	2.16E-02	4.52E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	1.90E-02	0.00E+00	1.53E-02	0.00E+00	1.53E-02	0.00E+00	6.31E-05	1.53E-02				
Phenanthrene	1.00E+00	0.00E+00	7.23E-01	0.00E+00	7.23E-01	0.00E+00	3.32E-03	7.26E-01				
Total LMW PAHs					5.37E+00	0.00E+00	2.56E-02	5.40E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.10E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	0.00E+00	6.97E-03	1.27E+00				
Benzo[A]Pyrene	8.70E-01	0.00E+00	5.50E-01	0.00E+00	5.50E-01	0.00E+00	2.89E-03	5.53E-01				
Benzo(b)fluoranthene	0.00E+00	7.00E-04	0.00E+00	0.00E+00	0.00E+00	1.16E-04	0.00E+00	1.16E-04				
Benzo(g,h,i)perylene	1.20E+00	0.00E+00	7.32E-01	0.00E+00	7.32E-01	0.00E+00	3.98E-03	7.36E-01				
Benzo(k)fluoranthene	1.90E+00	0.00E+00	1.18E+00	0.00E+00	1.18E+00	0.00E+00	6.31E-03	1.19E+00				
Chrysene	4.90E+00	0.00E+00	3.21E+00	0.00E+00	3.21E+00	0.00E+00	1.63E-02	3.22E+00				
Dibenz(A,H)Anthracene	4.10E-01	0.00E+00	2.46E-01	0.00E+00	2.46E-01	0.00E+00	1.36E-03	2.47E-01				
Indeno (1,2,3-CD) Pyrene	1.50E+00	0.00E+00	8.99E-01	0.00E+00	8.99E-01	0.00E+00	4.98E-03	9.04E-01				
Pyrene	6.80E+00	1.60E-03	4.77E+00	0.00E+00	4.77E+00	2.65E-04	2.26E-02	4.79E+00				
Total HMW PAHs					1.28E+01	3.82E-04	6.53E-02	1.29E+01	2.00E+00	6.45E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	2.20E-02	0.00E+00	0.00E+00	0.00E+00	3.65E-03	0.00E+00	3.65E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H12-2
Screening-Level Exposure Evaluation - American Dipper
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H12-3
Screening-Level Exposure Evaluation - Belted Kingfisher
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	1.54E+00	0.00E+00	2.02E+02	2.02E+02	2.43E-01	0.00E+00	2.02E+02	1.10E+02	1.84E+00	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	1.51E+02	2.16E-01	6.71E+00	9.12E+00	1.58E+01	3.40E-02	0.00E+00	1.59E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	5.70E-01	0.00E+00	1.50E-03	0.00E+00	1.50E-03	0.00E+00	0.00E+00	1.50E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	0.00E+00	2.12E-01	0.00E+00	0.00E+00	0.00E+00	3.34E-02	0.00E+00	3.34E-02	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	2.55E+01	1.90E-03	1.00E-01	6.79E-01	7.80E-01	2.99E-04	0.00E+00	7.80E-01	3.44E-01	2.27E+00	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	8.30E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	5.96E-02	0.00E+00	5.96E-02	4.00E-02	1.49E+00	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.30E-02	0.00E+00	2.38E-03	2.64E-02	2.87E-02	0.00E+00	0.00E+00	2.87E-02				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.60E-01	0.00E+00	1.10E-02	1.22E-01	1.33E-01	0.00E+00	0.00E+00	1.33E-01				
Fluoranthene	6.50E+00	0.00E+00	4.27E-01	4.73E+00	5.16E+00	0.00E+00	0.00E+00	5.16E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	1.90E-02	0.00E+00	1.45E-03	1.61E-02	1.75E-02	0.00E+00	0.00E+00	1.75E-02				
Phenanthrene	1.00E+00	0.00E+00	6.87E-02	7.61E-01	8.29E-01	0.00E+00	0.00E+00	8.29E-01				
Total LMW PAHs					6.16E+00	0.00E+00	0.00E+00	6.16E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.10E+00	0.00E+00	1.20E-01	1.32E+00	1.44E+00	0.00E+00	0.00E+00	1.44E+00				
Benzo[A]Pyrene	8.70E-01	0.00E+00	5.22E-02	5.78E-01	6.31E-01	0.00E+00	0.00E+00	6.31E-01				
Benzo(b)fluoranthene	0.00E+00	7.00E-04	0.00E+00	0.00E+00	0.00E+00	1.10E-04	0.00E+00	1.10E-04				
Benzo(g,h,i)perylene	1.20E+00	0.00E+00	6.95E-02	7.70E-01	8.40E-01	0.00E+00	0.00E+00	8.40E-01				
Benzo(k)fluoranthene	1.90E+00	0.00E+00	1.12E-01	1.24E+00	1.36E+00	0.00E+00	0.00E+00	1.36E+00				
Chrysene	4.90E+00	0.00E+00	3.05E-01	3.37E+00	3.68E+00	0.00E+00	0.00E+00	3.68E+00				
Dibenz(A,H)Anthracene	4.10E-01	0.00E+00	2.33E-02	2.59E-01	2.82E-01	0.00E+00	0.00E+00	2.82E-01				
Indeno (1,2,3-CD) Pyrene	1.50E+00	0.00E+00	8.53E-02	9.45E-01	1.03E+00	0.00E+00	0.00E+00	1.03E+00				
Pyrene	6.80E+00	1.60E-03	4.53E-01	5.02E+00	5.47E+00	2.52E-04	0.00E+00	5.47E+00				
Total HMW PAHs					1.47E+01	3.62E-04	0.00E+00	1.47E+01	2.00E+00	7.37E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	2.20E-02	0.00E+00	0.00E+00	0.00E+00	3.47E-03	0.00E+00	3.47E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H12-3
Screening-Level Exposure Evaluation - Belted Kingfisher
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H12-4
Screening-Level Exposure Evaluation - Mink
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	1.54E+00	0.00E+00	6.15E+01	6.15E+01	6.66E-02	0.00E+00	6.16E+01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	1.51E+02	2.16E-01	0.00E+00	2.78E+00	2.78E+00	9.34E-03	0.00E+00	2.79E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	5.70E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	0.00E+00	2.12E-01	0.00E+00	0.00E+00	0.00E+00	9.17E-03	0.00E+00	9.17E-03	5.15E+01	<1	1.46E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	2.55E+01	1.90E-03	0.00E+00	2.07E-01	2.07E-01	8.22E-05	0.00E+00	2.07E-01	4.16E+00	<1	9.44E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	8.30E+00	3.78E-01	0.00E+00	0.00E+00	0.00E+00	1.63E-02	0.00E+00	1.63E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.30E-02	0.00E+00	0.00E+00	8.04E-03	8.04E-03	0.00E+00	0.00E+00	8.04E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.60E-01	0.00E+00	0.00E+00	3.72E-02	3.72E-02	0.00E+00	0.00E+00	3.72E-02				
Fluoranthene	6.50E+00	0.00E+00	0.00E+00	1.44E+00	1.44E+00	0.00E+00	0.00E+00	1.44E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	1.90E-02	0.00E+00	0.00E+00	4.90E-03	4.90E-03	0.00E+00	0.00E+00	4.90E-03				
Phenanthrene	1.00E+00	0.00E+00	0.00E+00	2.32E-01	2.32E-01	0.00E+00	0.00E+00	2.32E-01				
Total LMW PAHs					1.72E+00	0.00E+00	0.00E+00	1.72E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.10E+00	0.00E+00	0.00E+00	4.04E-01	4.04E-01	0.00E+00	0.00E+00	4.04E-01				
Benzo[A]Pyrene	8.70E-01	0.00E+00	0.00E+00	1.76E-01	1.76E-01	0.00E+00	0.00E+00	1.76E-01				
Benzo(b)fluoranthene	0.00E+00	7.00E-04	0.00E+00	0.00E+00	0.00E+00	3.03E-05	0.00E+00	3.03E-05				
Benzo(g,h,i)perylene	1.20E+00	0.00E+00	0.00E+00	2.35E-01	2.35E-01	0.00E+00	0.00E+00	2.35E-01				
Benzo(k)fluoranthene	1.90E+00	0.00E+00	0.00E+00	3.79E-01	3.79E-01	0.00E+00	0.00E+00	3.79E-01				
Chrysene	4.90E+00	0.00E+00	0.00E+00	1.03E+00	1.03E+00	0.00E+00	0.00E+00	1.03E+00				
Dibenz(A,H)Anthracene	4.10E-01	0.00E+00	0.00E+00	7.89E-02	7.89E-02	0.00E+00	0.00E+00	7.89E-02				
Indeno (1,2,3-CD) Pyrene	1.50E+00	0.00E+00	0.00E+00	2.88E-01	2.88E-01	0.00E+00	0.00E+00	2.88E-01				
Pyrene	6.80E+00	1.60E-03	0.00E+00	1.53E+00	1.53E+00	6.92E-05	0.00E+00	1.53E+00				
Total HMW PAHs					4.12E+00	9.95E-05	0.00E+00	4.12E+00	6.15E-01	6.70E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	2.20E-02	0.00E+00	0.00E+00	0.00E+00	9.51E-04	0.00E+00	9.51E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H12-4
Screening-Level Exposure Evaluation - Mink
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H13-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Metals												
Aluminum	NA	0.00E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)	---	9.24E+02	0.00E+00	Sample et al. (1996)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)	---	4.00E+00	0.00E+00	Sample et al. (1996)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	6.80E+01	0.00E+00	Sample et al. (1996)
Barium	NA	1.30E-01	2.49E+02	NA	2.82E+00	---	7.02E+02	Hamilton et al. (2002)	---	2.98E+02	3.87E+01	Nakamoto and Hassler (1992)
Beryllium	NA	0.00E+00	0.00E+00	NA	1.67E-01	---	0.00E+00	Hamilton et al. (2002)	---	7.60E+01	0.00E+00	Sample et al. (1996)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.96E+04	0.00E+00	Sample et al. (1996)
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.20E+01	0.00E+00	Sample et al. (1996)
Copper	NA	0.00E+00	0.00E+00	NA	6.61E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.16E+03	0.00E+00	Sample et al. (1996)
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.80E+02	0.00E+00	Sample et al. (1996)
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c	---	1.92E+02	0.00E+00	DTSC (2000)
Nickel	NA	0.00E+00	0.00E+00	NA	1.34E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.24E+02	0.00E+00	Sample et al. (1996)
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)	---	1.04E+04	0.00E+00	Sample et al. (1996)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)	---	4.24E+02	0.00E+00	Laplace et al. (1992)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)	---	1.36E+02	0.00E+00	Sample et al. (1996)
Vanadium	NA	0.00E+00	0.00E+00	NA	2.50E-01	---	0.00E+00	Hamilton and Buhl (2002)	---	2.52E+03	0.00E+00	CECBP (2008)
Zinc	NA	0.00E+00	0.00E+00	NA	8.40E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	3.86E+03	0.00E+00	Sample et al. (1996)
Inorganics - Other Inorganics												
Cyanide	NA	1.53E-02	2.40E-01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)	---	Regression	0.00E+00	Derived based on Shi et al. (2009)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	3.73E+00	---	0.00E+00	DiToro and McGrath (2000)	4.59E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	3.53E+00	---	0.00E+00	DiToro and McGrath (2000)	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	4.01	0.00E+00	1.10E-02	7.04E-01	4.58E+00	---	5.03E-02	DiToro and McGrath (2000)	5.63E+00	---	6.20E-02	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	3.30E-02	7.54E-01	4.90E+00	---	1.62E-01	DiToro and McGrath (2000)	6.04E+00	---	1.99E-01	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	5.10E-02	6.73E-01	4.37E+00	---	2.23E-01	DiToro and McGrath (2000)	5.38E+00	---	2.74E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	1.90E-01	6.41E-01	4.17E+00	---	7.92E-01	DiToro and McGrath (2000)	5.13E+00	---	9.75E-01	DiToro and McGrath (2000)
Fluorene	4.21	0.00E+00	2.80E-02	6.92E-01	4.50E+00	---	1.26E-01	DiToro and McGrath (2000)	5.53E+00	---	1.55E-01	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)	5.96E+00	---	0.00E+00	DiToro and McGrath (2000)

Table H13-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Phenanthrene	4.57	0.00E+00	2.10E-01	6.70E-01	4.36E+00	---	9.15E-01	DiToro and McGrath (2000)	5.36E+00	---	1.13E+00	DiToro and McGrath (2000)
Total LMW PAHs							2.27E+00				2.79E+00	
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	6.71	0.00E+00	1.20E-01	5.56E-01	3.61E+00	---	4.34E-01	DiToro and McGrath (2000)	4.45E+00	---	5.34E-01	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	9.40E-02	5.86E-01	3.81E+00	---	3.58E-01	DiToro and McGrath (2000)	4.69E+00	---	4.41E-01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)	4.62E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	8.10E-02	5.66E-01	3.68E+00	---	2.98E-01	DiToro and McGrath (2000)	4.53E+00	---	3.67E-01	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	0.00E+00	5.77E-01	3.75E+00	---	0.00E+00	DiToro and McGrath (2000)	4.61E+00	---	0.00E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	1.30E-01	6.07E-01	3.94E+00	---	5.13E-01	DiToro and McGrath (2000)	4.85E+00	---	6.31E-01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	0.00E+00	5.56E-01	3.61E+00	---	0.00E+00	DiToro and McGrath (2000)	4.45E+00	---	0.00E+00	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	8.70E-02	5.55E-01	3.61E+00	---	3.14E-01	DiToro and McGrath (2000)	4.44E+00	---	3.87E-01	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.60E-01	6.50E-01	4.23E+00	---	6.76E-01	DiToro and McGrath (2000)	5.20E+00	---	8.32E-01	DiToro and McGrath (2000)
Total HMW PAHs							2.59E+00				3.19E+00	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00									
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)	5.59E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)	5.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)	5.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)	3.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00									
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)	5.78E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)	5.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)	3.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)	4.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00									
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane		0.00E+00	0.00E+00									
Dioxin/Furans												
2,3,7,8-TCDD		0.00E+00	0.00E+00									

Table H13-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Maximum Surface Water Concentration (mg/L)	Maximum Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00									
OCDD		0.00E+00	0.00E+00									
2,3,7,8-TCDF		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00									
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00									
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00									
OCDF		0.00E+00	0.00E+00									

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where $BSAF = K_{ow}^{-0.038}$ (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H13-2
Screening-Level Exposure Evaluation - American Dipper
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+02	--	1.10E+03	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	2.49E+02	1.30E-01	1.17E+02	0.00E+00	1.17E+02	2.16E-02	8.26E-01	1.17E+02	7.35E+01	1.60E+00	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	5.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E+00	1.89E+00	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-01	--	1.70E+00	--
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	2.40E-01	1.53E-02	0.00E+00	0.00E+00	0.00E+00	2.54E-03	7.96E-04	3.34E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	1.10E-02	0.00E+00	8.35E-03	0.00E+00	8.35E-03	0.00E+00	3.65E-05	8.39E-03				
Acenaphthylene	3.30E-02	0.00E+00	2.69E-02	0.00E+00	2.69E-02	0.00E+00	1.10E-04	2.70E-02				
Anthracene	5.10E-02	0.00E+00	3.70E-02	0.00E+00	3.70E-02	0.00E+00	1.69E-04	3.72E-02				
Fluoranthene	1.90E-01	0.00E+00	1.31E-01	0.00E+00	1.31E-01	0.00E+00	6.31E-04	1.32E-01				
Fluorene	2.80E-02	0.00E+00	2.09E-02	0.00E+00	2.09E-02	0.00E+00	9.29E-05	2.10E-02				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.10E-01	0.00E+00	1.52E-01	0.00E+00	1.52E-01	0.00E+00	6.97E-04	1.53E-01				
Total LMW PAHs					3.76E-01	0.00E+00	1.74E-03	3.78E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.20E-01	0.00E+00	7.20E-02	0.00E+00	7.20E-02	0.00E+00	3.98E-04	7.23E-02				
Benzo[A]Pyrene	9.40E-02	0.00E+00	5.94E-02	0.00E+00	5.94E-02	0.00E+00	3.12E-04	5.97E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	8.10E-02	0.00E+00	4.94E-02	0.00E+00	4.94E-02	0.00E+00	2.69E-04	4.97E-02				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	1.30E-01	0.00E+00	8.51E-02	0.00E+00	8.51E-02	0.00E+00	4.31E-04	8.55E-02				
Dibenz(A,H)Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	8.70E-02	0.00E+00	5.21E-02	0.00E+00	5.21E-02	0.00E+00	2.89E-04	5.24E-02				
Pyrene	1.60E-01	0.00E+00	1.12E-01	0.00E+00	1.12E-01	0.00E+00	5.31E-04	1.13E-01				
Total HMW PAHs					4.30E-01	0.00E+00	2.23E-03	4.32E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H13-2
Screening-Level Exposure Evaluation - American Dipper
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H13-3
Screening-Level Exposure Evaluation - Belted Kingfisher
Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+02	--	1.10E+03	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	2.49E+02	1.30E-01	1.11E+01	5.49E+00	1.66E+01	2.05E-02	0.00E+00	1.66E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	5.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-01	--	1.70E+00	--
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	2.40E-01	1.53E-02	0.00E+00	0.00E+00	0.00E+00	2.41E-03	0.00E+00	2.41E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	1.10E-02	0.00E+00	7.93E-04	8.79E-03	9.58E-03	0.00E+00	0.00E+00	9.58E-03				
Acenaphthylene	3.30E-02	0.00E+00	2.55E-03	2.82E-02	3.08E-02	0.00E+00	0.00E+00	3.08E-02				
Anthracene	5.10E-02	0.00E+00	3.51E-03	3.89E-02	4.24E-02	0.00E+00	0.00E+00	4.24E-02				
Fluoranthene	1.90E-01	0.00E+00	1.25E-02	1.38E-01	1.51E-01	0.00E+00	0.00E+00	1.51E-01				
Fluorene	2.80E-02	0.00E+00	1.98E-03	2.20E-02	2.40E-02	0.00E+00	0.00E+00	2.40E-02				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.10E-01	0.00E+00	1.44E-02	1.60E-01	1.74E-01	0.00E+00	0.00E+00	1.74E-01				
Total LMW PAHs					4.32E-01	0.00E+00	0.00E+00	4.32E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.20E-01	0.00E+00	6.83E-03	7.57E-02	8.25E-02	0.00E+00	0.00E+00	8.25E-02				
Benzo[A]Pyrene	9.40E-02	0.00E+00	5.64E-03	6.25E-02	6.81E-02	0.00E+00	0.00E+00	6.81E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	8.10E-02	0.00E+00	4.69E-03	5.20E-02	5.67E-02	0.00E+00	0.00E+00	5.67E-02				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	1.30E-01	0.00E+00	8.08E-03	8.95E-02	9.76E-02	0.00E+00	0.00E+00	9.76E-02				
Dibenz(A,H)Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	8.70E-02	0.00E+00	4.95E-03	5.48E-02	5.98E-02	0.00E+00	0.00E+00	5.98E-02				
Pyrene	1.60E-01	0.00E+00	1.07E-02	1.18E-01	1.29E-01	0.00E+00	0.00E+00	1.29E-01				
Total HMW PAHs					4.93E-01	0.00E+00	0.00E+00	4.93E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H13-3
Screening-Level Exposure Evaluation - Belted Kingfisher
Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H13-4
Screening-Level Exposure Evaluation - Mink
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	2.49E+02	1.30E-01	0.00E+00	1.67E+00	1.67E+00	5.62E-03	0.00E+00	1.68E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	5.71E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E+00	--	9.44E+00	--
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	2.40E-01	1.53E-02	0.00E+00	0.00E+00	0.00E+00	6.62E-04	0.00E+00	6.62E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	1.10E-02	0.00E+00	0.00E+00	2.68E-03	2.68E-03	0.00E+00	0.00E+00	2.68E-03				
Acenaphthylene	3.30E-02	0.00E+00	0.00E+00	8.61E-03	8.61E-03	0.00E+00	0.00E+00	8.61E-03				
Anthracene	5.10E-02	0.00E+00	0.00E+00	1.19E-02	1.19E-02	0.00E+00	0.00E+00	1.19E-02				
Fluoranthene	1.90E-01	0.00E+00	0.00E+00	4.21E-02	4.21E-02	0.00E+00	0.00E+00	4.21E-02				
Fluorene	2.80E-02	0.00E+00	0.00E+00	6.70E-03	6.70E-03	0.00E+00	0.00E+00	6.70E-03				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.10E-01	0.00E+00	0.00E+00	4.87E-02	4.87E-02	0.00E+00	0.00E+00	4.87E-02				
Total LMW PAHs					1.21E-01	0.00E+00	0.00E+00	1.21E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.20E-01	0.00E+00	0.00E+00	2.31E-02	2.31E-02	0.00E+00	0.00E+00	2.31E-02				
Benzo[A]Pyrene	9.40E-02	0.00E+00	0.00E+00	1.91E-02	1.91E-02	0.00E+00	0.00E+00	1.91E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	8.10E-02	0.00E+00	0.00E+00	1.59E-02	1.59E-02	0.00E+00	0.00E+00	1.59E-02				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	1.30E-01	0.00E+00	0.00E+00	2.73E-02	2.73E-02	0.00E+00	0.00E+00	2.73E-02				
Dibenz(A,H)Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	8.70E-02	0.00E+00	0.00E+00	1.67E-02	1.67E-02	0.00E+00	0.00E+00	1.67E-02				
Pyrene	1.60E-01	0.00E+00	0.00E+00	3.60E-02	3.60E-02	0.00E+00	0.00E+00	3.60E-02				
Total HMW PAHs					1.38E-01	0.00E+00	0.00E+00	1.38E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H13-4
Screening-Level Exposure Evaluation - Mink
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Sediment Concentration (mg/kg, dw)	Maximum Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)



Appendix H2 Refined Food Chain Models

Table H14-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	2.72E-01	Regression ^a	1.16E-02	USEPA (2007)	1.00E+00	2.72E-01	Assumption ^c	5.00E-02	1.36E-02	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	4.81E+00	3.75E-02	1.80E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	7.31E-01	Sample et al. (1999)	Regression ^f	2.84E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	0.00E+00	1.56E-01	0.00E+00	Bechtel-Jacobs (1998a) ^g	9.10E-02	0.00E+00	Sample et al. (1998a)	6.83E-04	0.00E+00	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	3.54E-01	Regression ^a	3.53E-01	Bechtel-Jacobs (1998a)	Regression ^d	3.63E+00	Sample et al. (1999)	Regression ^f	1.74E-01	Sample et al. (1998b)
Chromium	NA	2.97E-03	1.56E+01	4.10E-02	6.41E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	4.78E+00	Sample et al. (1998a)	Regression ^f	1.75E+00	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	1.64E+01	Regression ^a	5.87E+00	Bechtel-Jacobs (1998a)	5.15E-01	8.46E+00	Sample et al. (1998a)	Regression ^f	1.15E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	2.20E+01	Regression ^a	1.50E+00	Bechtel-Jacobs (1998a)	Regression ^d	9.76E+00	Sample et al. (1999)	Regression ^f	4.24E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	2.08E-02	Regression ^a	4.49E-02	Bechtel-Jacobs (1998a)	3.93E+00	8.17E-02	Sample et al. (1998a)	3.81E-01	7.92E-03	LANL (2015)
Nickel	NA	3.96E-03	3.17E+01	Regression ^a	1.44E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.46E+01	Sample et al. (1998a)	Regression ^f	3.91E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	2.65E-01	Regression ^a	1.17E-01	Bechtel-Jacobs (1998a)	Regression ^d	3.50E-01	Sample et al. (1998a)	Regression ^f	4.00E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	1.36E+01	4.85E-03	6.61E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.73E-01	Sample et al. (1998a)	1.23E-02	1.68E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	5.88E+01	Regression ^a	4.62E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.25E+02	Sample et al. (1998a)	Regression ^f	1.05E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	2.39E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	1.19E+02	6.00E-02	7.13E+00	Baes et al. (1984)	1.24E-01	1.47E+01	USCHPPM (2004)	1.60E-02	1.90E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	0.00E+00	8.90E-02	0.00E+00	USEPA (2007a)	2.92E+01	0.00E+00	USEPA (2007a)	2.53E-01	0.00E+00	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	1.48E+00	Regression ^a	2.75E-03	USEPA (2007a)	1.47E+00	2.17E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	2.58E+00	Regression ^a	7.78E-01	USEPA (2007a)	2.42E+00	6.25E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	2.05E+01	5.00E-01	1.02E+01	USEPA (2007a)	3.04E+00	6.23E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	1.00E+00	Regression ^a	3.84E-03	USEPA (2007a)	9.57E+00	9.57E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	5.24E-01	1.22E+01	6.40E+00	USEPA (2007a)	4.40E+00	2.31E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	1.32E+01	Regression ^a	4.19E+00	USEPA (2007a)	1.72E+00	2.26E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	5.75E-04	1.28E+01	Regression ^a	3.04E-01	USEPA (2007a)	1.59E+00	2.04E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H14-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo[A]Pyrene	6.11	1.94E-03	1.49E+01	Regression ^a	1.77E+00	USEPA (2007a)	1.33E+00	1.98E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	1.83E+01	3.10E-01	5.66E+00	USEPA (2007a)	2.60E+00	4.75E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	1.29E+01	Regression ^a	8.08E+00	USEPA (2007a)	2.94E+00	3.78E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	1.57E+01	Regression ^a	3.43E-01	USEPA (2007a)	2.29E+00	3.60E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	3.29E+00	1.30E-01	4.27E-01	USEPA (2007a)	2.31E+00	7.59E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	1.23E+01	1.10E-01	1.36E+00	USEPA (2007a)	2.86E+00	3.53E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	2.51E+01	7.20E-01	1.81E+01	USEPA (2007a)	1.75E+00	4.40E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	5.32E-01	2.38E-02	1.27E-02	USEPA (2007a)	5.44E+01	2.90E+01	USEPA (2007a)	7.79E-01	4.14E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	1.85E-02	8.14E-01	1.51E-02	USEPA (2007a)	1.03E+01	1.91E-01	USEPA (2007a)	4.49E-01	8.32E-03	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	2.53E-01	0.00E+00	USEPA (2007a)	1.79E+01	0.00E+00	USEPA (2007a)	2.65E+00	0.00E+00	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	0.00E+00	5.93E+00	0.00E+00	USEPA (2007a)	1.09E+01	0.00E+00	USEPA (2007a)	Regression ^g	0.00E+00	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	1.48E-07	9.41E-02	1.39E-08	USEPA (2007a) ^b	Regression ^d	2.89E-07	Sample et al. (1998a)	Regression ^h	6.99E-08	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	5.83E-07	5.17E-02	3.02E-08	USEPA (2007a) ^b	Regression ^d	1.46E-06	Sample et al. (1998a)	Regression ^h	3.15E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	1.14E-06	2.82E-02	3.21E-08	USEPA (2007a) ^b	Regression ^d	3.23E-06	Sample et al. (1998a)	Regression ^h	6.59E-07	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	5.41E-06	2.82E-02	1.53E-07	USEPA (2007a) ^b	Regression ^d	2.04E-05	Sample et al. (1998a)	Regression ^h	3.65E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	3.08E-06	2.82E-02	8.68E-08	USEPA (2007a) ^b	Regression ^d	1.05E-05	Sample et al. (1998a)	Regression ^h	1.97E-06	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	1.50E-04	1.55E-02	2.33E-06	USEPA (2007a) ^b	Regression ^d	1.03E-03	Sample et al. (1998a)	Regression ^h	1.41E-04	Sample et al. (1998b)
OCDD	9.50	0.00E+00	1.58E-03	8.45E-03	1.34E-05	USEPA (2007a) ^b	Regression ^d	1.67E-02	Sample et al. (1998a)	Regression ^h	1.88E-03	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	2.27E-06	1.69E-01	3.85E-07	USEPA (2007a) ^b	Regression ^d	7.30E-06	Sample et al. (1998a)	1.25E-01	2.84E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	6.01E-07	9.24E-02	5.55E-08	USEPA (2007a) ^b	Regression ^d	1.52E-06	Sample et al. (1998a)	1.25E-01	7.52E-08	Sample et al. (1998b) ^j
2,3,4,7,8-PeCDF	6.94	0.00E+00	3.65E-06	9.24E-02	3.37E-07	USEPA (2007a) ^b	Regression ^d	1.28E-05	Sample et al. (1998a)	1.25E-01	4.57E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	5.47E-06	3.70E-02	2.02E-07	USEPA (2007a) ^b	Regression ^d	2.06E-05	Sample et al. (1998a)	1.25E-01	6.84E-07	Sample et al. (1998b) ⁱ

Table H14-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	1.03E-06	3.70E-02	3.81E-08	USEPA (2007a) ^b	Regression ^d	2.87E-06	Sample et al. (1998a)	1.25E-01	1.29E-07	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	0.00E+00	3.70E-02	0.00E+00	USEPA (2007a) ^b	Regression ^d	0.00E+00	Sample et al. (1998a)	1.25E-01	0.00E+00	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	2.58E-06	5.08E-02	1.31E-07	USEPA (2007a) ^b	Regression ^d	8.49E-06	Sample et al. (1998a)	1.25E-01	3.23E-07	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	1.56E-05	2.77E-02	4.32E-07	USEPA (2007a) ^b	Regression ^d	7.12E-05	Sample et al. (1998a)	1.25E-01	1.95E-06	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	7.12E-07	2.77E-02	1.97E-08	USEPA (2007a) ^b	Regression ^d	1.85E-06	Sample et al. (1998a)	1.25E-01	8.91E-08	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	4.24E-05	1.52E-02	6.45E-07	USEPA (2007a) ^b	Regression ^d	2.32E-04	Sample et al. (1998a)	1.25E-01	5.30E-06	Sample et al. (1998b) ⁱ

Table H14-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H14-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.0	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	0.1	Regression ^a	6.57E-03	USEPA (2007)	1.00E+00	1.48E-01	Assumption ^c	5.00E-02	7.40E-03	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	4.6	3.75E-02	1.71E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	7.04E-01	Sample et al. (1999)	Regression ^f	2.72E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	0.0	1.56E-01	0.00E+00	Bechtel-Jacobs (1998a) ^g	9.10E-02	0.00E+00	Sample et al. (1998a)	6.83E-04	0.00E+00	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	0.2	Regression ^a	2.50E-01	Bechtel-Jacobs (1998a)	Regression ^d	2.20E+00	Sample et al. (1999)	Regression ^f	1.30E-01	Sample et al. (1998b)
Chromium	NA	2.97E-03	12.1	4.10E-02	4.96E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	3.70E+00	Sample et al. (1998a)	Regression ^f	1.45E+00	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.0	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	15.5	Regression ^a	5.75E+00	Bechtel-Jacobs (1998a)	5.15E-01	7.99E+00	Sample et al. (1998a)	Regression ^f	1.14E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	13.7	Regression ^a	1.15E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.66E+00	Sample et al. (1999)	Regression ^f	3.44E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	0.0	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ^j
Mercury	NA	1.46E-04	0.0	Regression ^a	4.98E-02	Bechtel-Jacobs (1998a)	3.93E+00	9.87E-02	Sample et al. (1998a)	3.81E-01	9.57E-03	LANL (2015)
Nickel	NA	3.96E-03	18.4	Regression ^a	9.58E-01	Bechtel-Jacobs (1998a)	7.78E-01	1.43E+01	Sample et al. (1998a)	Regression ^f	3.04E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	0.2	Regression ^a	6.45E-02	Bechtel-Jacobs (1998a)	Regression ^d	2.36E-01	Sample et al. (1998a)	Regression ^f	3.26E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a) ^m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	0.0	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	11.6	4.85E-03	5.61E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	4.86E-01	Sample et al. (1998a)	1.23E-02	1.42E-01	Sample et al. (1998b) ^j
Zinc	NA	2.54E-02	53.1	Regression ^a	4.36E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.15E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	2.76E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	8.80E+01	6.00E-02	5.28E+00	Baes et al. (1984)	1.24E-01	1.09E+01	USCHPPM (2004)	1.60E-02	1.41E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	0.00E+00	0.00E+00	8.90E-02	0.00E+00	USEPA (2007a)	2.92E+01	0.00E+00	USEPA (2007a)	2.53E-01	0.00E+00	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	5.93E-01	Regression ^a	6.01E-03	USEPA (2007a)	1.47E+00	8.72E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	1.12E+00	Regression ^a	4.07E-01	USEPA (2007a)	2.42E+00	2.71E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	9.95E+00	5.00E-01	4.98E+00	USEPA (2007a)	3.04E+00	3.02E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	4.10E-01	Regression ^a	8.24E-03	USEPA (2007a)	9.57E+00	3.92E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	2.88E-01	1.22E+01	3.52E+00	USEPA (2007a)	4.40E+00	1.27E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	5.70E+00	Regression ^a	2.49E+00	USEPA (2007a)	1.72E+00	9.81E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	5.75E-04	5.48E+00	Regression ^a	1.83E-01	USEPA (2007a)	1.59E+00	8.72E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	5.98E+00	Regression ^a	7.28E-01	USEPA (2007a)	1.33E+00	7.95E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H14-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(b)fluoranthene	6.2	5.09E-03	7.60E+00	3.10E-01	2.36E+00	USEPA (2007a)	2.60E+00	1.98E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	5.37E+00	Regression ^a	2.88E+00	USEPA (2007a)	2.94E+00	1.58E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	6.93E+00	Regression ^a	2.11E-01	USEPA (2007a)	2.29E+00	1.59E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	1.28E+00	1.30E-01	1.67E-01	USEPA (2007a)	2.31E+00	2.97E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	5.43E+00	1.10E-01	5.97E-01	USEPA (2007a)	2.86E+00	1.55E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	9.91E+00	7.20E-01	7.14E+00	USEPA (2007a)	1.75E+00	1.73E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	1.52E-01	2.38E-02	3.62E-03	USEPA (2007a)	5.44E+01	8.27E+00	USEPA (2007a)	7.79E-01	1.18E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	1.92E-02	8.14E-01	1.56E-02	USEPA (2007a)	1.03E+01	1.98E-01	USEPA (2007a)	4.49E-01	8.62E-03	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	2.53E-01	0.00E+00	USEPA (2007a)	1.79E+01	0.00E+00	USEPA (2007a)	2.65E+00	0.00E+00	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	0.00E+00	5.93E+00	0.00E+00	USEPA (2007a)	1.09E+01	0.00E+00	USEPA (2007a)	Regression ^g	0.00E+00	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	6.17E-08	9.41E-02	5.81E-09	USEPA (2007a) ^b	Regression ^d	1.03E-07	Sample et al. (1998a)	Regression ^h	2.67E-08	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	3.09E-07	5.17E-02	1.60E-08	USEPA (2007a) ^b	Regression ^d	6.91E-07	Sample et al. (1998a)	Regression ^h	1.57E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	6.41E-07	2.82E-02	1.81E-08	USEPA (2007a) ^b	Regression ^d	1.64E-06	Sample et al. (1998a)	Regression ^h	3.50E-07	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	3.32E-06	2.82E-02	9.36E-08	USEPA (2007a) ^b	Regression ^d	1.14E-05	Sample et al. (1998a)	Regression ^h	2.14E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	1.88E-06	2.82E-02	5.30E-08	USEPA (2007a) ^b	Regression ^d	5.84E-06	Sample et al. (1998a)	Regression ^h	1.14E-06	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	9.56E-05	1.55E-02	1.48E-06	USEPA (2007a) ^b	Regression ^d	6.07E-04	Sample et al. (1998a)	Regression ^h	8.58E-05	Sample et al. (1998b)
OCDD	9.50	0.00E+00	1.11E-03	8.45E-03	9.34E-06	USEPA (2007a) ^b	Regression ^d	1.10E-02	Sample et al. (1998a)	Regression ^h	1.27E-03	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	7.38E-07	1.69E-01	1.25E-07	USEPA (2007a) ^b	Regression ^d	1.93E-06	Sample et al. (1998a)	1.25E-01	9.23E-08	Sample et al. (1998b) ^j
1,2,3,7,8-PeCDF	6.94	0.00E+00	3.90E-07	9.24E-02	3.60E-08	USEPA (2007a) ^b	Regression ^d	9.10E-07	Sample et al. (1998a)	1.25E-01	4.88E-08	Sample et al. (1998b) ^j
2,3,4,7,8-PeCDF	6.94	0.00E+00	5.05E-07	9.24E-02	4.66E-08	USEPA (2007a) ^b	Regression ^d	1.23E-06	Sample et al. (1998a)	1.25E-01	6.32E-08	Sample et al. (1998b) ^j
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	1.92E-06	3.70E-02	7.10E-08	USEPA (2007a) ^b	Regression ^d	5.99E-06	Sample et al. (1998a)	1.25E-01	2.40E-07	Sample et al. (1998b) ^j
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.62E-07	3.70E-02	2.82E-08	USEPA (2007a) ^b	Regression ^d	2.01E-06	Sample et al. (1998a)	1.25E-01	9.53E-08	Sample et al. (1998b) ^j
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	1.05E-07	3.70E-02	3.88E-09	USEPA (2007a) ^b	Regression ^d	1.93E-07	Sample et al. (1998a)	1.25E-01	1.31E-08	Sample et al. (1998b) ^j

Table H14-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	8.42E-07	5.08E-02	4.28E-08	USEPA (2007a) ^b	Regression ^d	2.26E-06	Sample et al. (1998a)	1.25E-01	1.05E-07	Sample et al. (1998b) ^j
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	1.50E-05	2.77E-02	4.15E-07	USEPA (2007a) ^b	Regression ^d	6.80E-05	Sample et al. (1998a)	1.25E-01	1.88E-06	Sample et al. (1998b) ^j
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	3.35E-07	2.77E-02	9.27E-09	USEPA (2007a) ^b	Regression ^d	7.60E-07	Sample et al. (1998a)	1.25E-01	4.19E-08	Sample et al. (1998b) ^j
OCDF	8.87	0.00E+00	3.25E-05	1.52E-02	4.95E-07	USEPA (2007a) ^b	Regression ^d	1.70E-04	Sample et al. (1998a)	1.25E-01	4.07E-06	Sample et al. (1998b) ^j

Table H14-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Main Plant Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H14-2
Refined Exposure Evaluation - American Woodcock
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.72E-01	9.28E-04	1.37E-04	2.87E-02	0.00E+00	2.89E-02	1.09E-04	2.39E-03	3.14E-02	No TRV	--	No TRV	--
Arsenic	4.81E+00	9.37E-04	2.12E-03	7.73E-02	0.00E+00	7.94E-02	1.10E-04	4.23E-02	1.22E-01	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-02	0.00E+00	2.03E-02	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.07E-05	--	3.07E-05	No TRV	--	No TRV	--
Cadmium	3.54E-01	6.80E-04	4.15E-03	3.84E-01	0.00E+00	3.88E-01	7.99E-05	3.12E-03	3.91E-01	1.47E+00	<1	6.35E+00	<1
Chromium	1.56E+01	2.97E-03	7.53E-03	5.06E-01	0.00E+00	5.13E-01	3.49E-04	1.38E-01	6.51E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-04	0.00E+00	2.09E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.64E+01	9.09E-03	6.90E-02	8.94E-01	0.00E+00	9.63E-01	1.07E-03	1.45E-01	1.11E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.20E+01	1.75E-03	1.77E-02	1.03E+00	0.00E+00	1.05E+00	2.06E-04	1.94E-01	1.24E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-02	0.00E+00	1.58E-02	1.79E+02	<1	3.77E+02	<1
Mercury	2.08E-02	1.46E-04	5.27E-04	8.63E-03	0.00E+00	9.16E-03	1.72E-05	1.83E-04	9.36E-03	4.50E-01	<1	9.10E-01	<1
Nickel	3.17E+01	3.96E-03	1.69E-02	2.61E+00	0.00E+00	2.62E+00	4.65E-04	2.79E-01	2.90E+00	6.71E+00	<1	1.86E+01	<1
Selenium	2.65E-01	7.23E-04	1.38E-03	3.70E-02	0.00E+00	3.84E-02	8.49E-05	2.33E-03	4.08E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-05	0.00E+00	2.98E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.36E+01	2.33E-03	7.77E-04	6.05E-02	0.00E+00	6.13E-02	2.74E-04	1.20E-01	1.82E-01	3.44E-01	<1	1.70E+00	<1
Zinc	5.88E+01	2.54E-02	5.42E-01	3.44E+01	0.00E+00	3.50E+01	2.98E-03	5.18E-01	3.55E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.39E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	2.10E-03	6.90E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.19E+02	1.16E+00	8.38E-02	1.56E+00	0.00E+00	1.64E+00	1.36E-01	1.05E+00	2.82E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.48E+00	0.00E+00	3.23E-05	2.30E-01	0.00E+00	2.30E-01	0.00E+00	1.30E-02	2.43E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.58E+00	4.12E-04	9.14E-03	6.60E-01	0.00E+00	6.70E-01	4.83E-05	2.27E-02	6.92E-01				
Fluoranthene	2.05E+01	1.76E-03	1.20E-01	6.59E+00	0.00E+00	6.71E+00	2.07E-04	1.81E-01	6.89E+00				
Fluorene	1.00E+00	0.00E+00	4.51E-05	1.01E+00	0.00E+00	1.01E+00	0.00E+00	8.81E-03	1.02E+00				
Naphthalene	5.24E-01	5.78E-04	7.52E-02	2.44E-01	0.00E+00	3.19E-01	6.79E-05	4.62E-03	3.24E-01				
Phenanthrene	1.32E+01	5.53E-04	4.92E-02	2.39E+00	0.00E+00	2.44E+00	6.50E-05	1.16E-01	2.56E+00				
Total LMW PAHs						1.14E+01	3.88E-04	3.46E-01	1.17E+01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.28E+01	5.75E-04	3.57E-03	2.16E+00	0.00E+00	2.16E+00	6.76E-05	1.13E-01	2.28E+00				
Benzo[A]Pyrene	1.49E+01	1.94E-03	2.08E-02	2.10E+00	0.00E+00	2.12E+00	2.28E-04	1.31E-01	2.25E+00				
Benzo(b)fluoranthene	1.83E+01	5.09E-03	6.65E-02	5.02E+00	0.00E+00	5.09E+00	5.98E-04	1.61E-01	5.25E+00				
Benzo(g,h,i)perylene	1.29E+01	7.31E-04	9.50E-02	4.00E+00	0.00E+00	4.09E+00	8.58E-05	1.13E-01	4.21E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	1.57E+01	3.69E-03	4.03E-03	3.81E+00	0.00E+00	3.81E+00	4.33E-04	1.39E-01	3.95E+00				
Dibenz(A,H)Anthracene	3.29E+00	6.70E-05	5.02E-03	8.03E-01	0.00E+00	8.08E-01	7.87E-06	2.90E-02	8.37E-01				
Indeno (1,2,3-CD) Pyrene	1.23E+01	3.28E-04	1.59E-02	3.73E+00	0.00E+00	3.74E+00	3.85E-05	1.09E-01	3.85E+00				
Pyrene	2.51E+01	1.33E-03	2.13E-01	4.65E+00	0.00E+00	4.86E+00	1.56E-04	2.21E-01	5.08E+00				
Total HMW PAHs						2.67E+01	1.63E-03	1.02E+00	2.77E+01	2.00E+00	1.39E+01	2.00E+01	1.39E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.32E-01	5.25E-03	1.49E-04	3.06E+00	0.00E+00	3.06E+00	6.17E-04	4.69E-03	3.07E+00	1.10E+00	2.79E+00	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.85E-02	ND	1.77E-04	2.02E-02	0.00E+00	2.04E-02	--	1.63E-04	2.06E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H14-2
Refined Exposure Evaluation - American Woodcock
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.48E-07	0.00E+00	1.64E-10	3.06E-08	0.00E+00	3.08E-08	0.00E+00	1.30E-09	3.21E-08				
1,2,3,7,8-PeCDD	5.83E-07	0.00E+00	3.54E-10	1.55E-07	0.00E+00	1.55E-07	0.00E+00	5.14E-09	1.60E-07				
1,2,3,4,7,8-HxCDD	1.14E-06	0.00E+00	3.78E-10	3.42E-07	0.00E+00	1.71E-08	0.00E+00	5.02E-10	1.76E-08				
1,2,3,6,7,8-HxCDD	5.41E-06	0.00E+00	1.79E-09	2.15E-06	0.00E+00	2.16E-08	0.00E+00	4.77E-10	2.20E-08				
1,2,3,7,8,9-HxCDD	3.08E-06	0.00E+00	1.02E-09	1.11E-06	0.00E+00	1.11E-07	0.00E+00	2.71E-09	1.13E-07				
1,2,3,4,6,7,8-HpCDD	1.50E-04	0.00E+00	2.73E-08	1.09E-04	0.00E+00	1.09E-07	0.00E+00	1.32E-09	1.11E-07				
OCDD	1.58E-03	0.00E+00	1.57E-07	1.77E-03	0.00E+00	1.77E-07	0.00E+00	1.39E-09	1.78E-07				
2,3,7,8-TCDF	2.27E-06	0.00E+00	4.52E-09	7.72E-07	0.00E+00	7.76E-07	0.00E+00	2.00E-08	7.96E-07				
1,2,3,7,8-PeCDF	6.01E-07	0.00E+00	6.52E-10	1.60E-07	0.00E+00	1.61E-08	0.00E+00	5.30E-10	1.66E-08				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	3.96E-09	1.35E-06	0.00E+00	1.36E-06	0.00E+00	3.22E-08	1.39E-06				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	2.38E-09	2.18E-06	0.00E+00	2.18E-07	0.00E+00	4.82E-09	2.23E-07				
1,2,3,6,7,8-HxCDF	1.03E-06	0.00E+00	4.47E-10	3.03E-07	0.00E+00	3.04E-08	0.00E+00	9.08E-10	3.13E-08				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	1.54E-09	8.98E-07	0.00E+00	8.99E-08	0.00E+00	2.27E-09	9.22E-08				
1,2,3,4,6,7,8-HpCDF	1.56E-05	0.00E+00	5.07E-09	7.53E-06	0.00E+00	7.54E-08	0.00E+00	1.37E-09	7.67E-08				
1,2,3,4,7,8,9-HpCDF	7.12E-07	0.00E+00	2.31E-10	1.96E-07	0.00E+00	1.96E-09	0.00E+00	6.27E-11	2.02E-09				
OCDF	4.24E-05	0.00E+00	7.58E-09	2.46E-05	0.00E+00	2.46E-09	0.00E+00	3.74E-11	2.49E-09				
Total Dioxins/Furans						3.19E-06	0.00E+00	7.50E-08	3.19E-06	1.75E-06	1.82E+00	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-3
Refined Exposure Evaluation - Mourning Dove
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.72E-01	9.28E-04	1.33E-03	0.00E+00	0.00E+00	1.33E-03	1.06E-04	2.11E-03	3.54E-03	No TRV	--	No TRV	--
Arsenic	4.81E+00	9.37E-04	2.06E-02	0.00E+00	0.00E+00	2.06E-02	1.07E-04	3.73E-02	5.80E-02	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-02	0.00E+00	1.97E-02	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.98E-05	--	2.98E-05	No TRV	--	No TRV	--
Cadmium	3.54E-01	6.80E-04	4.03E-02	0.00E+00	0.00E+00	4.03E-02	7.76E-05	2.75E-03	4.31E-02	1.47E+00	<1	6.35E+00	<1
Chromium	1.56E+01	2.97E-03	7.32E-02	0.00E+00	0.00E+00	7.32E-02	3.39E-04	1.21E-01	1.95E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-04	0.00E+00	2.03E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.64E+01	9.09E-03	6.70E-01	0.00E+00	0.00E+00	6.70E-01	1.04E-03	1.27E-01	7.99E-01	4.05E+00	<1	3.48E+01	<1
Lead	2.20E+01	1.75E-03	1.72E-01	0.00E+00	0.00E+00	1.72E-01	2.00E-04	1.71E-01	3.43E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-02	0.00E+00	1.53E-02	1.79E+02	<1	3.77E+02	<1
Mercury	2.08E-02	1.46E-04	5.12E-03	0.00E+00	0.00E+00	5.12E-03	1.67E-05	1.61E-04	5.30E-03	4.50E-01	<1	9.10E-01	<1
Nickel	3.17E+01	3.96E-03	1.64E-01	0.00E+00	0.00E+00	1.64E-01	4.52E-04	2.46E-01	4.10E-01	6.71E+00	<1	1.86E+01	<1
Selenium	2.65E-01	7.23E-04	1.34E-02	0.00E+00	0.00E+00	1.34E-02	8.25E-05	2.05E-03	1.55E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-05	0.00E+00	2.90E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.36E+01	2.33E-03	7.55E-03	0.00E+00	0.00E+00	7.55E-03	2.66E-04	1.06E-01	1.14E-01	3.44E-01	<1	1.70E+00	<1
Zinc	5.88E+01	2.54E-02	5.27E+00	0.00E+00	0.00E+00	5.27E+00	2.89E-03	4.56E-01	5.73E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.39E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	1.85E-03	6.51E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.19E+02	1.16E+00	8.14E-01	0.00E+00	0.00E+00	8.14E-01	1.32E-01	9.22E-01	1.87E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.48E+00	0.00E+00	3.14E-04	0.00E+00	0.00E+00	3.14E-04	0.00E+00	1.15E-02	1.18E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.58E+00	4.12E-04	8.88E-02	0.00E+00	0.00E+00	8.88E-02	4.70E-05	2.00E-02	1.09E-01				
Fluoranthene	2.05E+01	1.76E-03	1.17E+00	0.00E+00	0.00E+00	1.17E+00	2.01E-04	1.59E-01	1.33E+00				
Fluorene	1.00E+00	0.00E+00	4.39E-04	0.00E+00	0.00E+00	4.39E-04	0.00E+00	7.76E-03	8.20E-03				
Naphthalene	5.24E-01	5.78E-04	7.30E-01	0.00E+00	0.00E+00	7.30E-01	6.60E-05	4.07E-03	7.34E-01				
Phenanthrene	1.32E+01	5.53E-04	4.78E-01	0.00E+00	0.00E+00	4.78E-01	6.31E-05	1.02E-01	5.80E-01				
Total LMW PAHs						2.47E+00	3.77E-04	3.05E-01	2.77E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.28E+01	5.75E-04	3.47E-02	0.00E+00	0.00E+00	3.47E-02	6.56E-05	9.97E-02	1.34E-01				
Benzo[A]Pyrene	1.49E+01	1.94E-03	2.02E-01	0.00E+00	0.00E+00	2.02E-01	2.21E-04	1.16E-01	3.18E-01				
Benzo(b)fluoranthene	1.83E+01	5.09E-03	6.47E-01	0.00E+00	0.00E+00	6.47E-01	5.81E-04	1.42E-01	7.89E-01				
Benzo(g,h,i)perylene	1.29E+01	7.31E-04	9.23E-01	0.00E+00	0.00E+00	9.23E-01	8.34E-05	9.98E-02	1.02E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	1.57E+01	3.69E-03	3.92E-02	0.00E+00	0.00E+00	3.92E-02	4.21E-04	1.22E-01	1.62E-01				
Dibenz(A,H)Anthracene	3.29E+00	6.70E-05	4.88E-02	0.00E+00	0.00E+00	4.88E-02	7.65E-06	2.55E-02	7.43E-02				
Indeno (1,2,3-CD) Pyrene	1.23E+01	3.28E-04	1.55E-01	0.00E+00	0.00E+00	1.55E-01	3.74E-05	9.57E-02	2.51E-01				
Pyrene	2.51E+01	1.33E-03	2.07E+00	0.00E+00	0.00E+00	2.07E+00	1.52E-04	1.95E-01	2.26E+00				
Total HMW PAHs						4.11E+00	1.59E-03	8.95E-01	5.01E+00	2.00E+00	2.51E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.32E-01	5.25E-03	1.44E-03	0.00E+00	0.00E+00	1.44E-03	5.99E-04	4.13E-03	6.17E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.85E-02	0.00E+00	1.72E-03	0.00E+00	0.00E+00	1.72E-03	0.00E+00	1.44E-04	1.87E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H14-3
Refined Exposure Evaluation - Mourning Dove
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.48E-07	0.00E+00	1.59E-09	0.00E+00	0.00E+00	1.59E-09	0.00E+00	1.15E-09	2.74E-09				
1,2,3,7,8-PeCDD	5.83E-07	0.00E+00	3.44E-09	0.00E+00	0.00E+00	3.44E-09	0.00E+00	4.52E-09	7.97E-09				
1,2,3,4,7,8-HxCDD	1.14E-06	0.00E+00	3.67E-09	0.00E+00	0.00E+00	1.83E-10	0.00E+00	4.42E-10	6.26E-10				
1,2,3,6,7,8-HxCDD	5.41E-06	0.00E+00	1.74E-08	0.00E+00	0.00E+00	1.74E-10	0.00E+00	4.20E-10	5.94E-10				
1,2,3,7,8,9-HxCDD	3.08E-06	0.00E+00	9.91E-09	0.00E+00	0.00E+00	9.91E-10	0.00E+00	2.39E-09	3.38E-09				
1,2,3,4,6,7,8-HpCDD	1.50E-04	0.00E+00	2.66E-07	0.00E+00	0.00E+00	2.66E-10	0.00E+00	1.16E-09	1.43E-09				
OCDD	1.58E-03	0.00E+00	1.53E-06	0.00E+00	0.00E+00	1.53E-10	0.00E+00	1.23E-09	1.38E-09				
2,3,7,8-TCDF	2.27E-06	0.00E+00	4.39E-08	0.00E+00	0.00E+00	4.39E-08	0.00E+00	1.76E-08	6.15E-08				
1,2,3,7,8-PeCDF	6.01E-07	0.00E+00	6.34E-09	0.00E+00	0.00E+00	6.34E-10	0.00E+00	4.66E-10	1.10E-09				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	3.85E-08	0.00E+00	0.00E+00	3.85E-08	0.00E+00	2.83E-08	6.68E-08				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	2.31E-08	0.00E+00	0.00E+00	2.31E-09	0.00E+00	4.25E-09	6.55E-09				
1,2,3,6,7,8-HxCDF	1.03E-06	0.00E+00	4.35E-09	0.00E+00	0.00E+00	4.35E-10	0.00E+00	7.99E-10	1.23E-09				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	1.50E-08	0.00E+00	0.00E+00	1.50E-09	0.00E+00	2.00E-09	3.50E-09				
1,2,3,4,6,7,8-HpCDF	1.56E-05	0.00E+00	4.93E-08	0.00E+00	0.00E+00	4.93E-10	0.00E+00	1.21E-09	1.70E-09				
1,2,3,4,7,8,9-HpCDF	7.12E-07	0.00E+00	2.25E-09	0.00E+00	0.00E+00	2.25E-11	0.00E+00	5.53E-11	7.78E-11				
OCDF	4.24E-05	0.00E+00	7.37E-08	0.00E+00	0.00E+00	7.37E-12	0.00E+00	3.29E-11	4.03E-11				
Total Dioxins/Furans						9.46E-08	0.00E+00	6.61E-08	1.61E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:	ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
	IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
	B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
	C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
	DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
	AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
	BW	= Body weight of the receptor, wet weight (kg)
	ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
	IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
	C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-4
Refined Exposure Evaluation - Red-tailed Hawk
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	2.72E-01	9.28E-04	0.00E+00	0.00E+00	1.11E-03	1.11E-03	7.61E-05	5.79E-04	1.77E-03	No TRV	--	No TRV	--
Arsenic	4.81E+00	9.37E-04	0.00E+00	0.00E+00	2.33E-03	2.33E-03	7.68E-05	1.02E-02	1.27E-02	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-02	0.00E+00	1.42E-02	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.14E-05	--	2.14E-05	No TRV	--	No TRV	--
Cadmium	3.54E-01	6.80E-04	0.00E+00	0.00E+00	1.43E-02	1.43E-02	5.58E-05	7.55E-04	1.51E-02	1.47E+00	<1	6.35E+00	<1
Chromium	1.56E+01	2.97E-03	0.00E+00	0.00E+00	1.43E-01	1.43E-01	2.44E-04	3.33E-02	1.77E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-04	0.00E+00	1.46E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.64E+01	9.09E-03	0.00E+00	0.00E+00	9.47E-01	9.47E-01	7.45E-04	3.50E-02	9.82E-01	4.05E+00	<1	3.48E+01	<1
Lead	2.20E+01	1.75E-03	0.00E+00	0.00E+00	3.48E-01	3.48E-01	1.44E-04	4.70E-02	3.95E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-02	0.00E+00	1.10E-02	1.79E+02	<1	3.77E+02	<1
Mercury	2.08E-02	1.46E-04	0.00E+00	0.00E+00	6.49E-04	6.49E-04	1.20E-05	4.43E-05	7.06E-04	4.50E-01	<1	9.10E-01	<1
Nickel	3.17E+01	3.96E-03	0.00E+00	0.00E+00	3.21E-01	3.21E-01	3.25E-04	6.76E-02	3.89E-01	6.71E+00	<1	1.86E+01	<1
Selenium	2.65E-01	7.23E-04	0.00E+00	0.00E+00	3.28E-02	3.28E-02	5.93E-05	5.65E-04	3.34E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-05	0.00E+00	2.08E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.36E+01	2.33E-03	0.00E+00	0.00E+00	1.38E-02	1.38E-02	1.91E-04	2.91E-02	4.30E-02	3.44E-01	<1	1.70E+00	<1
Zinc	5.88E+01	2.54E-02	0.00E+00	0.00E+00	8.58E+00	8.58E+00	2.08E-03	1.25E-01	8.71E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.39E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	5.09E-04	3.86E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.19E+02	1.16E+00	0.00E+00	0.00E+00	1.56E-01	1.56E-01	9.49E-02	2.53E-01	5.04E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.48E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.15E-03	3.15E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.58E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.37E-05	5.50E-03	3.37E-05	5.54E-03			
Fluoranthene	2.05E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-04	4.37E-02	4.38E-02				
Fluorene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-03	2.13E-03				
Naphthalene	5.24E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E-05	1.12E-03	1.17E-03				
Phenanthrene	1.32E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-05	2.81E-02	2.81E-02				
Total LMW PAHs						0.00E+00	2.71E-04	8.37E-02	8.39E-02	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.28E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-05	2.74E-02	2.74E-02				
Benzo[A]Pyrene	1.49E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	3.18E-02	3.20E-02				
Benzo(b)fluoranthene	1.83E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-04	3.90E-02	3.94E-02				
Benzo(g,h,i)perylene	1.29E+01	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-05	2.74E-02	2.75E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	1.57E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-04	3.35E-02	3.39E-02				
Dibenz(A,H)Anthracene	3.29E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-06	7.01E-03	7.01E-03				
Indeno (1,2,3-CD) Pyrene	1.23E+01	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.69E-05	2.63E-02	2.63E-02				
Pyrene	2.51E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	5.36E-02	5.37E-02				
Total HMW PAHs						0.00E+00	1.14E-03	2.46E-01	2.47E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.32E-01	5.25E-03	0.00E+00	0.00E+00	3.40E-02	3.40E-02	4.31E-04	1.13E-03	3.56E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.85E-02	0.00E+00	0.00E+00	0.00E+00	6.83E-04	6.83E-04	0.00E+00	3.95E-05	7.22E-04	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H14-4
Refined Exposure Evaluation - Red-tailed Hawk
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.48E-07	0.00E+00	0.00E+00	0.00E+00	5.73E-09	5.73E-09	0.00E+00	3.16E-10	6.05E-09				
1,2,3,7,8-PeCDD	5.83E-07	0.00E+00	0.00E+00	0.00E+00	2.59E-08	2.59E-08	0.00E+00	1.24E-09	2.71E-08				
1,2,3,4,7,8-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	5.41E-08	2.70E-09	0.00E+00	1.22E-10	2.83E-09				
1,2,3,6,7,8-HxCDD	5.41E-06	0.00E+00	0.00E+00	0.00E+00	3.00E-07	3.00E-09	0.00E+00	1.15E-10	3.11E-09				
1,2,3,7,8,9-HxCDD	3.08E-06	0.00E+00	0.00E+00	0.00E+00	1.61E-07	1.61E-08	0.00E+00	6.57E-10	1.68E-08				
1,2,3,4,6,7,8-HpCDD	1.50E-04	0.00E+00	0.00E+00	0.00E+00	1.16E-05	1.16E-08	0.00E+00	3.20E-10	1.19E-08				
OCDD	1.58E-03	0.00E+00	0.00E+00	0.00E+00	1.54E-04	1.54E-08	0.00E+00	3.37E-10	1.57E-08				
2,3,7,8-TCDF	2.27E-06	0.00E+00	0.00E+00	0.00E+00	2.33E-08	2.33E-08	0.00E+00	4.84E-09	2.81E-08				
1,2,3,7,8-PeCDF	6.01E-07	0.00E+00	0.00E+00	0.00E+00	6.17E-09	6.17E-10	0.00E+00	1.28E-10	7.45E-10				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	0.00E+00	0.00E+00	3.74E-08	3.74E-08	0.00E+00	7.78E-09	4.52E-08				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	0.00E+00	0.00E+00	5.61E-08	5.61E-09	0.00E+00	1.17E-09	6.78E-09				
1,2,3,6,7,8-HxCDF	1.03E-06	0.00E+00	0.00E+00	0.00E+00	1.06E-08	1.06E-09	0.00E+00	2.20E-10	1.28E-09				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	0.00E+00	0.00E+00	2.65E-08	2.65E-09	0.00E+00	5.50E-10	3.20E-09				
1,2,3,4,6,7,8-HpCDF	1.56E-05	0.00E+00	0.00E+00	0.00E+00	1.60E-07	1.60E-09	0.00E+00	3.33E-10	1.93E-09				
1,2,3,4,7,8,9-HpCDF	7.12E-07	0.00E+00	0.00E+00	0.00E+00	7.30E-09	7.30E-11	0.00E+00	1.52E-11	8.82E-11				
OCDF	4.24E-05	0.00E+00	0.00E+00	0.00E+00	4.35E-07	4.35E-11	0.00E+00	9.04E-12	5.25E-11				
Total Dioxins/Furans						1.53E-07	0.00E+00	1.82E-08	1.71E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.72E-01	9.28E-04	0.00E+00	4.30E-02	0.00E+00	4.30E-02	1.47E-04	0.00E+00	4.32E-02	No TRV	--	No TRV	--
Arsenic	4.81E+00	9.37E-04	0.00E+00	1.16E-01	0.00E+00	1.16E-01	1.48E-04	0.00E+00	1.16E-01	2.24E+00	<1	4.51E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-02	0.00E+00	2.74E-02	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	4.13E-05	--	4.13E-05	No TRV	--	No TRV	--
Cadmium	3.54E-01	6.80E-04	0.00E+00	5.75E-01	0.00E+00	5.75E-01	1.08E-04	0.00E+00	5.75E-01	1.47E+00	<1	6.35E+00	<1
Chromium	1.56E+01	2.97E-03	0.00E+00	7.57E-01	0.00E+00	7.57E-01	4.71E-04	0.00E+00	7.58E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	0.00E+00	2.82E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.64E+01	9.09E-03	0.00E+00	1.34E+00	0.00E+00	1.34E+00	1.44E-03	0.00E+00	1.34E+00	4.05E+00	<1	3.48E+01	<1
Lead	2.20E+01	1.75E-03	0.00E+00	1.55E+00	0.00E+00	1.55E+00	2.77E-04	0.00E+00	1.55E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-02	0.00E+00	2.13E-02	1.79E+02	<1	3.77E+02	<1
Mercury	2.08E-02	1.46E-04	0.00E+00	1.29E-02	0.00E+00	1.29E-02	2.31E-05	0.00E+00	1.30E-02	4.50E-01	<1	9.10E-01	<1
Nickel	3.17E+01	3.96E-03	0.00E+00	3.90E+00	0.00E+00	3.90E+00	6.27E-04	0.00E+00	3.90E+00	6.71E+00	<1	1.86E+01	<1
Selenium	2.65E-01	7.23E-04	0.00E+00	5.55E-02	0.00E+00	5.55E-02	1.14E-04	0.00E+00	5.56E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-05	0.00E+00	4.02E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.36E+01	2.33E-03	0.00E+00	9.07E-02	0.00E+00	9.07E-02	3.70E-04	0.00E+00	9.10E-02	3.44E-01	<1	1.70E+00	<1
Zinc	5.88E+01	2.54E-02	0.00E+00	5.15E+01	0.00E+00	5.15E+01	4.01E-03	0.00E+00	5.15E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.39E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.19E+02	1.16E+00	0.00E+00	2.33E+00	0.00E+00	2.33E+00	1.83E-01	0.00E+00	2.52E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.48E+00	0.00E+00	0.00E+00	3.44E-01	0.00E+00	3.44E-01	0.00E+00	0.00E+00	3.44E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.58E+00	4.12E-04	0.00E+00	9.89E-01	0.00E+00	9.89E-01	6.52E-05	0.00E+00	9.89E-01				
Fluoranthene	2.05E+01	1.76E-03	0.00E+00	9.86E+00	0.00E+00	9.86E+00	2.79E-04	0.00E+00	9.86E+00				
Fluorene	1.00E+00	0.00E+00	0.00E+00	1.51E+00	0.00E+00	1.51E+00	0.00E+00	0.00E+00	1.51E+00				
Naphthalene	5.24E-01	5.78E-04	0.00E+00	3.65E-01	0.00E+00	3.65E-01	9.15E-05	0.00E+00	3.65E-01				
Phenanthrene	1.32E+01	5.53E-04	0.00E+00	3.58E+00	0.00E+00	3.58E+00	8.76E-05	0.00E+00	3.58E+00				
Total LMW PAHs						1.67E+01	5.23E-04	0.00E+00	1.67E+01	1.61E+01	1.03E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.28E+01	5.75E-04	0.00E+00	3.23E+00	0.00E+00	3.23E+00	9.11E-05	0.00E+00	3.23E+00				
Benzo(A)Pyrene	1.49E+01	1.94E-03	0.00E+00	3.14E+00	0.00E+00	3.14E+00	3.07E-04	0.00E+00	3.14E+00				
Benzo(b)fluoranthene	1.83E+01	5.09E-03	0.00E+00	7.52E+00	0.00E+00	7.52E+00	8.06E-04	0.00E+00	7.52E+00				
Benzo(g,h,i)perylene	1.29E+01	7.31E-04	0.00E+00	5.99E+00	0.00E+00	5.99E+00	1.16E-04	0.00E+00	5.99E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	1.57E+01	3.69E-03	0.00E+00	5.70E+00	0.00E+00	5.70E+00	5.84E-04	0.00E+00	5.71E+00				
Dibenz(A,H)Anthracene	3.29E+00	6.70E-05	0.00E+00	1.20E+00	0.00E+00	1.20E+00	1.06E-05	0.00E+00	1.20E+00				
Indeno (1,2,3-CD) Pyrene	1.23E+01	3.28E-04	0.00E+00	5.58E+00	0.00E+00	5.58E+00	5.19E-05	0.00E+00	5.58E+00				
Pyrene	2.51E+01	1.33E-03	0.00E+00	6.96E+00	0.00E+00	6.96E+00	2.11E-04	0.00E+00	6.96E+00				
Total HMW PAHs						3.93E+01	2.20E-03	0.00E+00	3.93E+01	2.00E+00	1.97E+01	2.00E+01	1.97E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.32E-01	5.25E-03	0.00E+00	4.58E+00	0.00E+00	4.58E+00	8.31E-04	0.00E+00	4.59E+00	1.10E+00	4.17E+00	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.85E-02	0.00E+00	0.00E+00	3.03E-02	0.00E+00	3.03E-02	0.00E+00	0.00E+00	3.03E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H14-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.48E-07	0.00E+00	0.00E+00	4.58E-08	0.00E+00	4.58E-08	0.00E+00	0.00E+00	4.58E-08				
1,2,3,7,8-PeCDD	5.83E-07	0.00E+00	0.00E+00	2.32E-07	0.00E+00	2.32E-07	0.00E+00	0.00E+00	2.32E-07				
1,2,3,4,7,8-HxCDD	1.14E-06	0.00E+00	0.00E+00	5.12E-07	0.00E+00	2.56E-08	0.00E+00	0.00E+00	2.56E-08				
1,2,3,6,7,8-HxCDD	5.41E-06	0.00E+00	0.00E+00	3.23E-06	0.00E+00	3.23E-08	0.00E+00	0.00E+00	3.23E-08				
1,2,3,7,8,9-HxCDD	3.08E-06	0.00E+00	0.00E+00	1.66E-06	0.00E+00	1.66E-07	0.00E+00	0.00E+00	1.66E-07				
1,2,3,4,6,7,8-HpCDD	1.50E-04	0.00E+00	0.00E+00	1.64E-04	0.00E+00	1.64E-07	0.00E+00	0.00E+00	1.64E-07				
OCDD	1.58E-03	0.00E+00	0.00E+00	2.65E-03	0.00E+00	2.65E-07	0.00E+00	0.00E+00	2.65E-07				
2,3,7,8-TCDF	2.27E-06	0.00E+00	0.00E+00	1.16E-06	0.00E+00	1.16E-06	0.00E+00	0.00E+00	1.16E-06				
1,2,3,7,8-PeCDF	6.01E-07	0.00E+00	0.00E+00	2.40E-07	0.00E+00	2.40E-08	0.00E+00	0.00E+00	2.40E-08				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	0.00E+00	2.03E-06	0.00E+00	2.03E-06	0.00E+00	0.00E+00	2.03E-06				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	0.00E+00	3.27E-06	0.00E+00	3.27E-07	0.00E+00	0.00E+00	3.27E-07				
1,2,3,6,7,8-HxCDF	1.03E-06	0.00E+00	0.00E+00	4.54E-07	0.00E+00	4.54E-08	0.00E+00	0.00E+00	4.54E-08				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	0.00E+00	1.34E-06	0.00E+00	1.34E-07	0.00E+00	0.00E+00	1.34E-07				
1,2,3,4,6,7,8-HpCDF	1.56E-05	0.00E+00	0.00E+00	1.13E-05	0.00E+00	1.13E-07	0.00E+00	0.00E+00	1.13E-07				
1,2,3,4,7,8,9-HpCDF	7.12E-07	0.00E+00	0.00E+00	2.93E-07	0.00E+00	2.93E-09	0.00E+00	0.00E+00	2.93E-09				
OCDF	4.24E-05	0.00E+00	0.00E+00	3.68E-05	0.00E+00	3.68E-09	0.00E+00	0.00E+00	3.68E-09				
Total Dioxins/Furans						4.76E-06	0.00E+00	0.00E+00	4.76E-06	1.75E-06	2.72E+00	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-6
Refined Exposure Evaluation - Canada Lynx
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	2.72E-01	9.28E-04	0.00E+00	0.00E+00	4.25E-04	4.25E-04	2.90E-05	2.38E-04	6.91E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	4.81E+00	9.37E-04	0.00E+00	0.00E+00	8.87E-04	8.87E-04	2.93E-05	4.20E-03	5.12E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.40E-03	0.00E+00	5.40E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	8.15E-06	--	8.15E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	3.54E-01	6.80E-04	0.00E+00	0.00E+00	5.44E-03	5.44E-03	2.12E-05	3.10E-04	5.78E-03	7.70E-01	<1	6.87E+00	<1
Chromium	1.56E+01	2.97E-03	0.00E+00	0.00E+00	5.46E-02	5.46E-02	9.29E-05	1.37E-02	6.83E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.56E-05	0.00E+00	5.56E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.64E+01	9.09E-03	0.00E+00	0.00E+00	3.61E-01	3.61E-01	2.84E-04	1.44E-02	3.75E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.20E+01	1.75E-03	0.00E+00	0.00E+00	1.32E-01	1.32E-01	5.47E-05	1.93E-02	1.52E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-03	0.00E+00	4.20E-03	5.15E+01	<1	1.46E+02	<1
Mercury	2.08E-02	1.46E-04	0.00E+00	0.00E+00	2.47E-04	2.47E-04	4.56E-06	1.82E-05	2.70E-04	1.41E+00	<1	1.41E+01	<1
Nickel	3.17E+01	3.96E-03	0.00E+00	0.00E+00	1.22E-01	1.22E-01	1.24E-04	2.77E-02	1.50E-01	1.70E+00	<1	1.48E+01	<1
Selenium	2.65E-01	7.23E-04	0.00E+00	0.00E+00	1.25E-02	1.25E-02	2.26E-05	2.32E-04	1.28E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.94E-06	0.00E+00	7.94E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	1.36E+01	2.33E-03	0.00E+00	0.00E+00	5.24E-03	5.24E-03	7.29E-05	1.19E-02	1.72E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.88E+01	2.54E-02	0.00E+00	0.00E+00	3.27E+00	3.27E+00	7.92E-04	5.14E-02	3.32E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.39E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	2.09E-04	1.48E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.19E+02	1.16E+00	0.00E+00	0.00E+00	5.94E-02	5.94E-02	3.62E-02	1.04E-01	1.99E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.48E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-03	1.29E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.58E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-05	2.26E-03	1.29E-05				
Fluoranthene	2.05E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-05	1.79E-02	1.80E-02				
Fluorene	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.75E-04	8.75E-04				
Naphthalene	5.24E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-05	4.59E-04	4.77E-04				
Phenanthrene	1.32E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	1.15E-02	1.15E-02				
Total LMW PAHs						0.00E+00	1.03E-04	3.43E-02	3.44E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.28E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05	1.12E-02	1.13E-02				
Benzo[A]Pyrene	1.49E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-05	1.30E-02	1.31E-02				
Benzo(b)fluoranthene	1.83E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	1.60E-02	1.61E-02				
Benzo(g,h,i)perylene	1.29E+01	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-05	1.12E-02	1.13E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	1.57E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-04	1.38E-02	1.39E-02				
Dibenz(A,H)Anthracene	3.29E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-06	2.87E-03	2.88E-03				
Indeno (1,2,3-CD) Pyrene	1.23E+01	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-05	1.08E-02	1.08E-02				
Pyrene	2.51E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-05	2.20E-02	2.20E-02				
Total HMW PAHs						0.00E+00	4.34E-04	1.01E-01	1.01E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.32E-01	5.25E-03	0.00E+00	0.00E+00	1.30E-02	1.30E-02	1.64E-04	4.65E-04	1.36E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.85E-02	0.00E+00	0.00E+00	0.00E+00	2.60E-04	2.60E-04	0.00E+00	1.62E-05	2.76E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H14-6
Refined Exposure Evaluation - Canada Lynx
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.48E-07	0.00E+00	0.00E+00	0.00E+00	2.18E-09	2.18E-09	0.00E+00	1.29E-10	2.31E-09				
1,2,3,7,8-PeCDD	5.83E-07	0.00E+00	0.00E+00	0.00E+00	9.86E-09	9.86E-09	0.00E+00	5.10E-10	1.04E-08				
1,2,3,4,7,8-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	2.06E-08	2.06E-09	0.00E+00	9.97E-11	2.16E-09				
1,2,3,6,7,8-HxCDD	5.41E-06	0.00E+00	0.00E+00	0.00E+00	1.14E-07	1.14E-08	0.00E+00	4.73E-10	1.19E-08				
1,2,3,7,8,9-HxCDD	3.08E-06	0.00E+00	0.00E+00	0.00E+00	6.14E-08	6.14E-09	0.00E+00	2.69E-10	6.41E-09				
1,2,3,4,6,7,8-HpCDD	1.50E-04	0.00E+00	0.00E+00	0.00E+00	4.40E-06	4.40E-08	0.00E+00	1.31E-09	4.53E-08				
OCDD	1.58E-03	0.00E+00	0.00E+00	0.00E+00	5.86E-05	1.76E-08	0.00E+00	4.15E-10	1.80E-08				
2,3,7,8-TCDF	2.27E-06	0.00E+00	0.00E+00	0.00E+00	8.87E-09	8.87E-10	0.00E+00	1.99E-10	1.09E-09				
1,2,3,7,8-PeCDF	6.01E-07	0.00E+00	0.00E+00	0.00E+00	2.35E-09	7.05E-11	0.00E+00	1.58E-11	8.62E-11				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	0.00E+00	0.00E+00	1.43E-08	4.28E-09	0.00E+00	9.58E-10	5.24E-09				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	0.00E+00	0.00E+00	2.14E-08	2.14E-09	0.00E+00	4.79E-10	2.62E-09				
1,2,3,6,7,8-HxCDF	1.03E-06	0.00E+00	0.00E+00	0.00E+00	4.03E-09	4.03E-10	0.00E+00	9.01E-11	4.93E-10				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	0.00E+00	0.00E+00	1.01E-08	1.01E-09	0.00E+00	2.26E-10	1.23E-09				
1,2,3,4,6,7,8-HpCDF	1.56E-05	0.00E+00	0.00E+00	0.00E+00	6.10E-08	6.10E-10	0.00E+00	1.36E-10	7.46E-10				
1,2,3,4,7,8,9-HpCDF	7.12E-07	0.00E+00	0.00E+00	0.00E+00	2.78E-09	2.78E-11	0.00E+00	6.23E-12	3.41E-11				
OCDF	4.24E-05	0.00E+00	0.00E+00	0.00E+00	1.66E-07	4.97E-11	0.00E+00	1.11E-11	6.08E-11				
Total Dioxins/Furans						1.03E-07	0.00E+00	5.33E-09	1.08E-07	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-7
Refined Exposure Evaluation - Grizzly Bear
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	2.72E-01	9.28E-04	1.63E-04	8.80E-04	2.93E-05	0.00E+00	1.07E-03	2.00E-05	1.64E-04	1.26E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	4.81E+00	9.37E-04	2.53E-03	2.37E-03	6.13E-05	0.00E+00	4.96E-03	2.02E-05	2.91E-03	7.89E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-03	0.00E+00	3.73E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	0.00E+00	5.64E-06	--	5.64E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	3.54E-01	6.80E-04	4.95E-03	1.18E-02	3.76E-04	0.00E+00	1.71E-02	1.47E-05	2.14E-04	1.73E-02	7.70E-01	<1	6.87E+00	<1
Chromium	1.56E+01	2.97E-03	9.00E-03	1.55E-02	3.77E-03	0.00E+00	2.83E-02	6.42E-05	9.45E-03	3.78E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-05	0.00E+00	3.84E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.64E+01	9.09E-03	8.25E-02	2.74E-02	2.49E-02	0.00E+00	1.35E-01	1.96E-04	9.93E-03	1.45E-01	5.60E+00	<1	8.27E+01	<1
Lead	2.20E+01	1.75E-03	2.11E-02	3.16E-02	9.15E-03	0.00E+00	6.19E-02	3.78E-05	1.33E-02	7.52E-02	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-03	0.00E+00	2.90E-03	5.15E+01	<1	1.46E+02	<1
Mercury	2.08E-02	1.46E-04	6.30E-04	2.65E-04	1.71E-05	0.00E+00	9.12E-04	3.15E-06	1.26E-05	9.28E-04	1.41E+00	<1	1.41E+01	<1
Nickel	3.17E+01	3.96E-03	2.02E-02	7.98E-02	8.44E-03	0.00E+00	1.08E-01	8.55E-05	1.92E-02	1.28E-01	1.70E+00	<1	1.48E+01	<1
Selenium	2.65E-01	7.23E-04	1.64E-03	1.13E-03	8.64E-04	0.00E+00	3.64E-03	1.56E-05	1.60E-04	3.82E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-06	0.00E+00	5.49E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	1.36E+01	2.33E-03	9.28E-04	1.85E-03	3.62E-04	0.00E+00	3.15E-03	5.04E-05	8.24E-03	1.14E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.88E+01	2.54E-02	6.48E-01	1.05E+00	2.26E-01	0.00E+00	1.93E+00	5.48E-04	3.55E-02	1.96E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	2.39E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	1.44E-04	1.03E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.19E+02	1.16E+00	1.00E-01	4.77E-02	4.11E-03	0.00E+00	1.52E-01	2.50E-02	7.18E-02	2.49E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	1.48E+00	0.00E+00	3.86E-05	7.03E-03	0.00E+00	0.00E+00	7.07E-03	0.00E+00	8.93E-04	7.97E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	2.58E+00	4.12E-04	1.09E-02	2.02E-02	0.00E+00	0.00E+00	3.12E-02	8.89E-06	1.56E-03	3.27E-02				
Fluoranthene	2.05E+01	1.76E-03	1.44E-01	2.02E-01	0.00E+00	0.00E+00	3.46E-01	3.80E-05	1.24E-02	3.58E-01				
Fluorene	1.00E+00	0.00E+00	5.39E-05	3.10E-02	0.00E+00	0.00E+00	3.10E-02	0.00E+00	6.04E-04	3.16E-02				
Naphthalene	5.24E-01	5.78E-04	8.98E-02	7.48E-03	0.00E+00	0.00E+00	9.73E-02	1.25E-05	3.17E-04	9.76E-02				
Phenanthrene	1.32E+01	5.53E-04	5.88E-02	7.33E-02	0.00E+00	0.00E+00	1.32E-01	1.19E-05	7.96E-03	1.40E-01				
Total LMW PAHs							6.44E-01	7.13E-05	2.37E-02	6.68E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.28E+01	5.75E-04	4.27E-03	6.62E-02	0.00E+00	0.00E+00	7.04E-02	1.24E-05	7.77E-03	7.82E-02				
Benzo(A)Pyrene	1.49E+01	1.94E-03	2.49E-02	6.42E-02	0.00E+00	0.00E+00	8.91E-02	4.19E-05	9.02E-03	9.82E-02				
Benzo(b)fluoranthene	1.83E+01	5.09E-03	7.95E-02	1.54E-01	0.00E+00	0.00E+00	2.33E-01	1.10E-04	1.10E-02	2.45E-01				
Benzo(g,h,i)perylene	1.29E+01	7.31E-04	1.13E-01	1.22E-01	0.00E+00	0.00E+00	2.36E-01	1.58E-05	7.77E-03	2.44E-01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	1.57E+01	3.69E-03	4.82E-03	1.17E-01	0.00E+00	0.00E+00	1.22E-01	7.96E-05	9.51E-03	1.31E-01				
Dibenz(A,H)Anthracene	3.29E+00	6.70E-05	6.00E-03	2.46E-02	0.00E+00	0.00E+00	3.06E-02	1.45E-06	1.99E-03	3.26E-02				
Indeno (1,2,3-CD) Pyrene	1.23E+01	3.28E-04	1.90E-02	1.14E-01	0.00E+00	0.00E+00	1.33E-01	7.08E-06	7.46E-03	1.41E-01				
Pyrene	2.51E+01	1.33E-03	2.54E-01	1.42E-01	0.00E+00	0.00E+00	3.96E-01	2.87E-05	1.52E-02	4.12E-01				
Total HMW PAHs							1.31E+00	3.00E-04	6.98E-02	1.38E+00	6.15E-01	2.25E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	5.32E-01	5.25E-03	1.78E-04	9.38E-02	8.95E-04	0.00E+00	9.49E-02	1.13E-04	3.22E-04	9.53E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.85E-02	0.00E+00	2.12E-04	6.19E-04	1.80E-05	0.00E+00	8.49E-04	0.00E+00	1.12E-05	8.60E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	--	2.27E+01	--

Table H14-7
Refined Exposure Evaluation - Grizzly Bear
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	1.48E-07	0.00E+00	1.95E-10	9.38E-10	1.51E-10	0.00E+00	1.28E-09	0.00E+00	8.95E-11	1.37E-09				
1,2,3,7,8-PeCDD	5.83E-07	0.00E+00	4.24E-10	4.74E-09	6.81E-10	0.00E+00	5.85E-09	0.00E+00	3.53E-10	6.20E-09				
1,2,3,4,7,8-HxCDD	1.14E-06	0.00E+00	4.51E-10	1.05E-08	1.42E-09	0.00E+00	1.23E-09	0.00E+00	6.89E-11	1.30E-09				
1,2,3,6,7,8-HxCDD	5.41E-06	0.00E+00	2.14E-09	6.60E-08	7.89E-09	0.00E+00	7.60E-09	0.00E+00	3.27E-10	7.93E-09				
1,2,3,7,8,9-HxCDD	3.08E-06	0.00E+00	1.22E-09	3.39E-08	4.25E-09	0.00E+00	3.94E-09	0.00E+00	1.86E-10	4.12E-09				
1,2,3,4,6,7,8-HpCDD	1.50E-04	0.00E+00	3.27E-08	3.35E-06	3.04E-07	0.00E+00	3.69E-08	0.00E+00	9.07E-10	3.78E-08				
OCDD	1.58E-03	0.00E+00	1.88E-07	5.42E-05	4.05E-06	0.00E+00	1.75E-08	0.00E+00	2.87E-10	1.78E-08				
2,3,7,8-TCDF	2.27E-06	0.00E+00	5.40E-09	2.36E-08	6.13E-10	0.00E+00	2.97E-09	0.00E+00	1.37E-10	3.10E-09				
1,2,3,7,8-PeCDF	6.01E-07	0.00E+00	7.79E-10	4.91E-09	1.62E-10	0.00E+00	1.76E-10	0.00E+00	1.09E-11	1.87E-10				
2,3,4,7,8-PeCDF	3.65E-06	0.00E+00	4.73E-09	4.14E-08	9.86E-10	0.00E+00	1.41E-08	0.00E+00	6.62E-10	1.48E-08				
1,2,3,4,7,8-HxCDF	5.47E-06	0.00E+00	2.84E-09	6.69E-08	1.48E-09	0.00E+00	7.12E-09	0.00E+00	3.31E-10	7.45E-09				
1,2,3,6,7,8-HxCDF	1.03E-06	0.00E+00	5.35E-10	9.29E-09	2.78E-10	0.00E+00	1.01E-09	0.00E+00	6.23E-11	1.07E-09				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	2.58E-06	0.00E+00	1.84E-09	2.75E-08	6.97E-10	0.00E+00	3.00E-09	0.00E+00	1.56E-10	3.16E-09				
1,2,3,4,6,7,8-HpCDF	1.56E-05	0.00E+00	6.06E-09	2.31E-07	4.21E-09	0.00E+00	2.41E-09	0.00E+00	9.43E-11	2.50E-09				
1,2,3,4,7,8,9-HpCDF	7.12E-07	0.00E+00	2.77E-10	6.00E-09	1.92E-10	0.00E+00	6.47E-11	0.00E+00	4.31E-12	6.90E-11				
OCDF	4.24E-05	0.00E+00	9.06E-09	7.52E-07	1.15E-08	0.00E+00	2.32E-10	0.00E+00	7.69E-12	2.40E-10				
Total Dioxins/Furans							1.05E-07	0.00E+00	3.68E-09	1.09E-07	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-8
Refined Exposure Evaluation - Long-tailed Weasel
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	1.48E-01	9.28E-04	0.00E+00	0.00E+00	3.81E-04	3.81E-04	4.78E-05	1.22E-04	5.51E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	4.56E+00	9.37E-04	0.00E+00	0.00E+00	1.40E-03	1.40E-03	4.82E-05	3.75E-03	5.20E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.90E-03	0.00E+00	8.90E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.89E-01	6.80E-04	0.00E+00	0.00E+00	6.67E-03	6.67E-03	3.50E-05	1.56E-04	6.86E-03	7.70E-01	<1	6.87E+00	<1
Chromium	1.21E+01	2.97E-03	0.00E+00	0.00E+00	7.45E-02	7.45E-02	1.53E-04	9.97E-03	8.46E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.15E-05	0.00E+00	9.15E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.55E+01	9.09E-03	0.00E+00	0.00E+00	5.89E-01	5.89E-01	4.68E-04	1.28E-02	6.02E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.37E+01	1.75E-03	0.00E+00	0.00E+00	1.77E-01	1.77E-01	9.01E-05	1.13E-02	1.88E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.92E-03	0.00E+00	6.92E-03	5.15E+01	<1	1.46E+02	<1
Mercury	2.51E-02	1.46E-04	0.00E+00	0.00E+00	4.92E-04	4.92E-04	7.51E-06	2.07E-05	5.20E-04	1.41E+00	<1	1.41E+01	<1
Nickel	1.84E+01	3.96E-03	0.00E+00	0.00E+00	1.56E-01	1.56E-01	2.04E-04	1.52E-02	1.72E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.54E-01	7.23E-04	0.00E+00	0.00E+00	1.68E-02	1.68E-02	3.72E-05	1.27E-04	1.70E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-05	0.00E+00	1.31E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.16E+01	2.33E-03	0.00E+00	0.00E+00	7.33E-03	7.33E-03	1.20E-04	9.53E-03	1.70E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.31E+01	2.54E-02	0.00E+00	0.00E+00	5.35E+00	5.35E+00	1.30E-03	4.37E-02	5.39E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	2.27E-04	2.33E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	8.80E+01	1.16E+00	0.00E+00	0.00E+00	7.25E-02	7.25E-02	5.96E-02	7.25E-02	2.05E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.93E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-04	4.88E-04				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.12E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-05	9.23E-04	2.12E-05	9.44E-04			
Fluoranthene	9.95E+00	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-05	8.19E-03	8.28E-03				
Fluorene	4.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-04	3.38E-04				
Naphthalene	2.88E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-05	2.37E-04	2.67E-04				
Phenanthrene	5.70E+00	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-05	4.70E-03	4.72E-03				
Total LMW PAHs						0.00E+00	1.70E-04	1.49E-02	1.50E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.48E+00	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-05	4.51E-03	4.54E-03				
Benzo[A]Pyrene	5.98E+00	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.97E-05	4.92E-03	5.02E-03				
Benzo(b)fluoranthene	7.60E+00	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-04	6.26E-03	6.52E-03				
Benzo(g,h,i)perylene	5.37E+00	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-05	4.42E-03	4.46E-03				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	6.93E+00	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-04	5.71E-03	5.90E-03				
Dibenz(A,H)Anthracene	1.28E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-06	1.06E-03	1.06E-03				
Indeno (1,2,3-CD) Pyrene	5.43E+00	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-05	4.47E-03	4.49E-03				
Pyrene	9.91E+00	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-05	8.16E-03	8.23E-03				
Total HMW PAHs						0.00E+00	7.15E-04	3.95E-02	4.02E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.52E-01	5.25E-03	0.00E+00	0.00E+00	6.09E-03	6.09E-03	2.70E-04	1.25E-04	6.49E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.92E-02	0.00E+00	0.00E+00	0.00E+00	4.44E-04	4.44E-04	0.00E+00	1.58E-05	4.59E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H14-8
Refined Exposure Evaluation - Long-tailed Weasel
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	6.17E-08	0.00E+00	0.00E+00	0.00E+00	1.37E-09	1.37E-09	0.00E+00	5.08E-11	1.43E-09				
1,2,3,7,8-PeCDD	3.09E-07	0.00E+00	0.00E+00	0.00E+00	8.08E-09	8.08E-09	0.00E+00	2.54E-10	8.33E-09				
1,2,3,4,7,8-HxCDD	6.41E-07	0.00E+00	0.00E+00	0.00E+00	1.80E-08	1.80E-09	0.00E+00	5.28E-11	1.85E-09				
1,2,3,6,7,8-HxCDD	3.32E-06	0.00E+00	0.00E+00	0.00E+00	1.10E-07	1.10E-08	0.00E+00	2.73E-10	1.13E-08				
1,2,3,7,8,9-HxCDD	1.88E-06	0.00E+00	0.00E+00	0.00E+00	5.88E-08	5.88E-09	0.00E+00	1.55E-10	6.04E-09				
1,2,3,4,6,7,8-HpCDD	9.56E-05	0.00E+00	0.00E+00	0.00E+00	4.42E-06	4.42E-08	0.00E+00	7.87E-10	4.50E-08				
OCDD	1.11E-03	0.00E+00	0.00E+00	0.00E+00	6.51E-05	1.95E-08	0.00E+00	2.73E-10	1.98E-08				
2,3,7,8-TCDF	7.38E-07	0.00E+00	0.00E+00	0.00E+00	4.75E-09	4.75E-10	0.00E+00	6.08E-11	5.36E-10				
1,2,3,7,8-PeCDF	3.90E-07	0.00E+00	0.00E+00	0.00E+00	2.51E-09	7.53E-11	0.00E+00	9.63E-12	8.50E-11				
2,3,4,7,8-PeCDF	5.05E-07	0.00E+00	0.00E+00	0.00E+00	3.25E-09	9.75E-10	0.00E+00	1.25E-10	1.10E-09				
1,2,3,4,7,8-HxCDF	1.92E-06	0.00E+00	0.00E+00	0.00E+00	1.24E-08	1.24E-09	0.00E+00	1.58E-10	1.39E-09				
1,2,3,6,7,8-HxCDF	7.62E-07	0.00E+00	0.00E+00	0.00E+00	4.91E-09	4.91E-10	0.00E+00	6.27E-11	5.53E-10				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	0.00E+00	0.00E+00	6.76E-10	6.76E-11	0.00E+00	8.65E-12	7.62E-11				
1,2,3,7,8,9-HxCDF	8.42E-07	0.00E+00	0.00E+00	0.00E+00	5.42E-09	5.42E-10	0.00E+00	6.93E-11	6.11E-10				
1,2,3,4,6,7,8-HpCDF	1.50E-05	0.00E+00	0.00E+00	0.00E+00	9.66E-08	9.66E-10	0.00E+00	1.24E-10	1.09E-09				
1,2,3,4,7,8,9-HpCDF	3.35E-07	0.00E+00	0.00E+00	0.00E+00	2.16E-09	2.16E-11	0.00E+00	2.76E-12	2.43E-11				
OCDF	3.25E-05	0.00E+00	0.00E+00	0.00E+00	2.09E-07	6.28E-11	0.00E+00	8.03E-12	7.08E-11				
Total Dioxins/Furans						9.68E-08	0.00E+00	2.47E-09	9.92E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-9
Refined Exposure Evaluation - Meadow Vole
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	1.48E-01	9.28E-04	9.87E-04	0.00E+00	0.00E+00	9.87E-04	1.39E-04	2.89E-04	1.42E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	4.56E+00	9.37E-04	2.57E-02	0.00E+00	0.00E+00	2.57E-02	1.41E-04	8.90E-03	3.47E-02	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-02	0.00E+00	2.60E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.92E-05	--	3.92E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.89E-01	6.80E-04	3.76E-02	0.00E+00	0.00E+00	3.76E-02	1.02E-04	3.69E-04	3.81E-02	7.70E-01	<1	6.87E+00	<1
Chromium	1.21E+01	2.97E-03	7.46E-02	0.00E+00	0.00E+00	7.46E-02	4.47E-04	2.36E-02	9.86E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-04	0.00E+00	2.67E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.55E+01	9.09E-03	8.63E-01	0.00E+00	0.00E+00	8.63E-01	1.37E-03	3.03E-02	8.95E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.37E+01	1.75E-03	1.73E-01	0.00E+00	0.00E+00	1.73E-01	2.63E-04	2.68E-02	2.00E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-02	0.00E+00	2.02E-02	5.15E+01	<1	1.46E+02	<1
Mercury	2.51E-02	1.46E-04	7.48E-03	0.00E+00	0.00E+00	7.48E-03	2.19E-05	4.90E-05	7.55E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.84E+01	3.96E-03	1.44E-01	0.00E+00	0.00E+00	1.44E-01	5.95E-04	3.60E-02	1.81E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.54E-01	7.23E-04	9.69E-03	0.00E+00	0.00E+00	9.69E-03	1.09E-04	3.01E-04	1.01E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E-05	0.00E+00	3.82E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.16E+01	2.33E-03	8.44E-03	0.00E+00	0.00E+00	8.44E-03	3.51E-04	2.26E-02	3.14E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.31E+01	2.54E-02	6.56E+00	0.00E+00	0.00E+00	6.56E+00	3.81E-03	1.04E-01	6.66E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	5.38E-04	6.67E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	8.80E+01	1.16E+00	7.94E-01	0.00E+00	0.00E+00	7.94E-01	1.74E-01	1.72E-01	1.14E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.93E-01	0.00E+00	9.02E-04	0.00E+00	0.00E+00	9.02E-04	0.00E+00	1.16E-03	2.06E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.12E+00	4.12E-04	6.11E-02	0.00E+00	0.00E+00	6.11E-02	6.18E-05	2.19E-03	6.34E-02				
Fluoranthene	9.95E+00	1.76E-03	7.47E-01	0.00E+00	0.00E+00	7.47E-01	2.64E-04	1.94E-02	7.67E-01				
Fluorene	4.10E-01	0.00E+00	1.24E-03	0.00E+00	0.00E+00	1.24E-03	0.00E+00	8.01E-04	2.04E-03				
Naphthalene	2.88E-01	5.78E-04	5.28E-01	0.00E+00	0.00E+00	5.28E-01	8.69E-05	5.63E-04	5.29E-01				
Phenanthrene	5.70E+00	5.53E-04	3.75E-01	0.00E+00	0.00E+00	3.75E-01	8.31E-05	1.11E-02	3.86E-01				
Total LMW PAHs						1.71E+00	4.96E-04	3.53E-02	1.75E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.48E+00	5.75E-04	2.75E-02	0.00E+00	0.00E+00	2.75E-02	8.64E-05	1.07E-02	3.83E-02				
Benzo[A]Pyrene	5.98E+00	1.94E-03	1.09E-01	0.00E+00	0.00E+00	1.09E-01	2.91E-04	1.17E-02	1.21E-01				
Benzo(b)fluoranthene	7.60E+00	5.09E-03	3.54E-01	0.00E+00	0.00E+00	3.54E-01	7.65E-04	1.48E-02	3.70E-01				
Benzo(g,h,i)perylene	5.37E+00	7.31E-04	4.33E-01	0.00E+00	0.00E+00	4.33E-01	1.10E-04	1.05E-02	4.43E-01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	6.93E+00	3.69E-03	3.17E-02	0.00E+00	0.00E+00	3.17E-02	5.54E-04	1.35E-02	4.58E-02				
Dibenz(A,H)Anthracene	1.28E+00	6.70E-05	2.51E-02	0.00E+00	0.00E+00	2.51E-02	1.01E-05	2.51E-03	2.76E-02				
Indeno (1,2,3-CD) Pyrene	5.43E+00	3.28E-04	8.97E-02	0.00E+00	0.00E+00	8.97E-02	4.92E-05	1.06E-02	1.00E-01				
Pyrene	9.91E+00	1.33E-03	1.07E+00	0.00E+00	0.00E+00	1.07E+00	2.00E-04	1.94E-02	1.09E+00				
Total HMW PAHs						2.14E+00	2.09E-03	9.37E-02	2.24E+00	6.15E-01	3.64E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.52E-01	5.25E-03	5.43E-04	0.00E+00	0.00E+00	5.43E-04	7.89E-04	2.97E-04	1.63E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.92E-02	0.00E+00	2.35E-03	0.00E+00	0.00E+00	2.35E-03	0.00E+00	3.75E-05	2.39E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H14-9
Refined Exposure Evaluation - Meadow Vole
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	6.17E-08	0.00E+00	8.72E-10	0.00E+00	0.00E+00	8.72E-10	0.00E+00	1.21E-10	9.93E-10				
1,2,3,7,8-PeCDD	3.09E-07	0.00E+00	2.40E-09	0.00E+00	0.00E+00	2.40E-09	0.00E+00	6.03E-10	3.01E-09				
1,2,3,4,7,8-HxCDD	6.41E-07	0.00E+00	2.72E-09	0.00E+00	0.00E+00	2.72E-10	0.00E+00	1.25E-10	3.97E-10				
1,2,3,6,7,8-HxCDD	3.32E-06	0.00E+00	1.41E-08	0.00E+00	0.00E+00	1.41E-09	0.00E+00	6.48E-10	2.05E-09				
1,2,3,7,8,9-HxCDD	1.88E-06	0.00E+00	7.96E-09	0.00E+00	0.00E+00	7.96E-10	0.00E+00	3.67E-10	1.16E-09				
1,2,3,4,6,7,8-HpCDD	9.56E-05	0.00E+00	2.23E-07	0.00E+00	0.00E+00	2.23E-09	0.00E+00	1.87E-09	4.09E-09				
OCDD	1.11E-03	0.00E+00	1.40E-06	0.00E+00	0.00E+00	4.21E-10	0.00E+00	6.48E-10	1.07E-09				
2,3,7,8-TCDF	7.38E-07	0.00E+00	1.88E-08	0.00E+00	0.00E+00	1.88E-09	0.00E+00	1.44E-10	2.02E-09				
1,2,3,7,8-PeCDF	3.90E-07	0.00E+00	5.41E-09	0.00E+00	0.00E+00	1.62E-10	0.00E+00	2.29E-11	1.85E-10				
2,3,4,7,8-PeCDF	5.05E-07	0.00E+00	7.01E-09	0.00E+00	0.00E+00	2.10E-09	0.00E+00	2.96E-10	2.40E-09				
1,2,3,4,7,8-HxCDF	1.92E-06	0.00E+00	1.07E-08	0.00E+00	0.00E+00	1.07E-09	0.00E+00	3.75E-10	1.44E-09				
1,2,3,6,7,8-HxCDF	7.62E-07	0.00E+00	4.23E-09	0.00E+00	0.00E+00	4.23E-10	0.00E+00	1.49E-10	5.72E-10				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	5.83E-10	0.00E+00	0.00E+00	5.83E-11	0.00E+00	2.05E-11	7.88E-11				
1,2,3,7,8,9-HxCDF	8.42E-07	0.00E+00	6.43E-09	0.00E+00	0.00E+00	6.43E-10	0.00E+00	1.64E-10	8.07E-10				
1,2,3,4,6,7,8-HpCDF	1.50E-05	0.00E+00	6.24E-08	0.00E+00	0.00E+00	6.24E-10	0.00E+00	2.93E-10	9.17E-10				
1,2,3,4,7,8,9-HpCDF	3.35E-07	0.00E+00	1.39E-09	0.00E+00	0.00E+00	1.39E-11	0.00E+00	6.54E-12	2.05E-11				
OCDF	3.25E-05	0.00E+00	7.43E-08	0.00E+00	0.00E+00	2.23E-11	0.00E+00	1.90E-11	4.13E-11				
Total Dioxins/Furans						1.54E-08	0.00E+00	5.87E-09	2.13E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-10
Refined Exposure Evaluation - North American Wolverine
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	1.48E-01	9.28E-04	0.00E+00	0.00E+00	2.22E-04	2.22E-04	2.79E-05	1.25E-04	3.75E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	4.56E+00	9.37E-04	0.00E+00	0.00E+00	8.17E-04	8.17E-04	2.81E-05	3.83E-03	4.68E-03	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.19E-03	0.00E+00	5.19E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	7.84E-06	--	7.84E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	1.89E-01	6.80E-04	0.00E+00	0.00E+00	3.89E-03	3.89E-03	2.04E-05	1.59E-04	4.07E-03	7.70E-01	<1	6.87E+00	<1
Chromium	1.21E+01	2.97E-03	0.00E+00	0.00E+00	4.35E-02	4.35E-02	8.93E-05	1.02E-02	5.38E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-05	0.00E+00	5.34E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.55E+01	9.09E-03	0.00E+00	0.00E+00	3.44E-01	3.44E-01	2.73E-04	1.31E-02	3.57E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.37E+01	1.75E-03	0.00E+00	0.00E+00	1.03E-01	1.03E-01	5.26E-05	1.15E-02	1.15E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.04E-03	0.00E+00	4.04E-03	5.15E+01	<1	1.46E+02	<1
Mercury	2.51E-02	1.46E-04	0.00E+00	0.00E+00	2.87E-04	2.87E-04	4.39E-06	2.11E-05	3.13E-04	1.41E+00	<1	1.41E+01	<1
Nickel	1.84E+01	3.96E-03	0.00E+00	0.00E+00	9.13E-02	9.13E-02	1.19E-04	1.55E-02	1.07E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.54E-01	7.23E-04	0.00E+00	0.00E+00	9.81E-03	9.81E-03	2.17E-05	1.30E-04	9.96E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-06	0.00E+00	7.63E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	1.16E+01	2.33E-03	0.00E+00	0.00E+00	4.28E-03	4.28E-03	7.02E-05	9.74E-03	1.41E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.31E+01	2.54E-02	0.00E+00	0.00E+00	3.12E+00	3.12E+00	7.62E-04	4.47E-02	3.17E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	2.32E-04	1.46E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	8.80E+01	1.16E+00	0.00E+00	0.00E+00	4.23E-02	4.23E-02	3.48E-02	7.41E-02	1.51E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.93E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.99E-04	4.99E-04				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.12E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-05	9.43E-04	1.24E-05				
Fluoranthene	9.95E+00	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	8.37E-03	8.42E-03				
Fluorene	4.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-04	3.45E-04				
Naphthalene	2.88E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	2.43E-04	2.60E-04				
Phenanthrene	5.70E+00	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-05	4.80E-03	4.82E-03				
Total LMW PAHs						0.00E+00	9.92E-05	1.52E-02	1.53E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.48E+00	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	4.61E-03	4.63E-03				
Benzo[A]Pyrene	5.98E+00	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-05	5.03E-03	5.09E-03				
Benzo(b)fluoranthene	7.60E+00	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-04	6.39E-03	6.55E-03				
Benzo(g,h,i)perylene	5.37E+00	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-05	4.52E-03	4.54E-03				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	6.93E+00	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-04	5.83E-03	5.94E-03				
Dibenz(A,H)Anthracene	1.28E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-06	1.08E-03	1.08E-03				
Indeno (1,2,3-CD) Pyrene	5.43E+00	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-06	4.57E-03	4.58E-03				
Pyrene	9.91E+00	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-05	8.34E-03	8.38E-03				
Total HMW PAHs						0.00E+00	4.18E-04	4.04E-02	4.08E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.52E-01	5.25E-03	0.00E+00	0.00E+00	3.56E-03	3.56E-03	1.58E-04	1.28E-04	3.84E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.92E-02	0.00E+00	0.00E+00	0.00E+00	2.59E-04	2.59E-04	0.00E+00	1.62E-05	2.75E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H14-10
Refined Exposure Evaluation - North American Wolverine
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	6.17E-08	0.00E+00	0.00E+00	0.00E+00	8.03E-10	8.03E-10	0.00E+00	5.19E-11	8.54E-10				
1,2,3,7,8-PeCDD	3.09E-07	0.00E+00	0.00E+00	0.00E+00	4.72E-09	4.72E-09	0.00E+00	2.60E-10	4.98E-09				
1,2,3,4,7,8-HxCDD	6.41E-07	0.00E+00	0.00E+00	0.00E+00	1.05E-08	1.05E-09	0.00E+00	5.39E-11	1.11E-09				
1,2,3,6,7,8-HxCDD	3.32E-06	0.00E+00	0.00E+00	0.00E+00	6.42E-08	6.42E-09	0.00E+00	2.79E-10	6.69E-09				
1,2,3,7,8,9-HxCDD	1.88E-06	0.00E+00	0.00E+00	0.00E+00	3.43E-08	3.43E-09	0.00E+00	1.58E-10	3.59E-09				
1,2,3,4,6,7,8-HpCDD	9.56E-05	0.00E+00	0.00E+00	0.00E+00	2.58E-06	2.58E-08	0.00E+00	8.04E-10	2.66E-08				
OCDD	1.11E-03	0.00E+00	0.00E+00	0.00E+00	3.80E-05	1.14E-08	0.00E+00	2.79E-10	1.17E-08				
2,3,7,8-TCDF	7.38E-07	0.00E+00	0.00E+00	0.00E+00	2.77E-09	2.77E-10	0.00E+00	6.21E-11	3.39E-10				
1,2,3,7,8-PeCDF	3.90E-07	0.00E+00	0.00E+00	0.00E+00	1.47E-09	4.40E-11	0.00E+00	9.84E-12	5.38E-11				
2,3,4,7,8-PeCDF	5.05E-07	0.00E+00	0.00E+00	0.00E+00	1.90E-09	5.69E-10	0.00E+00	1.27E-10	6.97E-10				
1,2,3,4,7,8-HxCDF	1.92E-06	0.00E+00	0.00E+00	0.00E+00	7.22E-09	7.22E-10	0.00E+00	1.62E-10	8.83E-10				
1,2,3,6,7,8-HxCDF	7.62E-07	0.00E+00	0.00E+00	0.00E+00	2.86E-09	2.86E-10	0.00E+00	6.41E-11	3.51E-10				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	0.00E+00	0.00E+00	3.95E-10	3.95E-11	0.00E+00	8.83E-12	4.83E-11				
1,2,3,7,8,9-HxCDF	8.42E-07	0.00E+00	0.00E+00	0.00E+00	3.16E-09	3.16E-10	0.00E+00	7.08E-11	3.87E-10				
1,2,3,4,6,7,8-HpCDF	1.50E-05	0.00E+00	0.00E+00	0.00E+00	5.64E-08	5.64E-10	0.00E+00	1.26E-10	6.90E-10				
1,2,3,4,7,8,9-HpCDF	3.35E-07	0.00E+00	0.00E+00	0.00E+00	1.26E-09	1.26E-11	0.00E+00	2.82E-12	1.54E-11				
OCDF	3.25E-05	0.00E+00	0.00E+00	0.00E+00	1.22E-07	3.66E-11	0.00E+00	8.20E-12	4.48E-11				
Total Dioxins/Furans						5.65E-08	0.00E+00	2.53E-09	5.90E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H14-11
Refined Exposure Evaluation - Short-tailed Shrew
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	1.48E-01	9.28E-04	0.00E+00	1.98E-02	0.00E+00	1.98E-02	1.24E-04	2.18E-04	2.02E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	4.56E+00	9.37E-04	0.00E+00	9.44E-02	0.00E+00	9.44E-02	1.26E-04	6.72E-03	1.01E-01	1.04E+00	<1	4.55E+00	<1
Barium	0.00E+00	1.73E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-02	0.00E+00	2.32E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.50E-05	--	3.50E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.89E-01	6.80E-04	0.00E+00	2.95E-01	0.00E+00	2.95E-01	9.11E-05	2.79E-04	2.96E-01	7.70E-01	<1	6.87E+00	<1
Chromium	1.21E+01	2.97E-03	0.00E+00	4.96E-01	0.00E+00	4.96E-01	3.99E-04	1.78E-02	5.15E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-04	0.00E+00	2.38E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.55E+01	9.09E-03	0.00E+00	1.07E+00	0.00E+00	1.07E+00	1.22E-03	2.29E-02	1.10E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.37E+01	1.75E-03	0.00E+00	8.92E-01	0.00E+00	8.92E-01	2.35E-04	2.02E-02	9.12E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-02	0.00E+00	1.80E-02	5.15E+01	<1	1.46E+02	<1
Mercury	2.51E-02	1.46E-04	0.00E+00	1.32E-02	0.00E+00	1.32E-02	1.96E-05	3.70E-05	1.33E-02	1.41E+00	<1	1.41E+01	<1
Nickel	1.84E+01	3.96E-03	0.00E+00	1.92E+00	0.00E+00	1.92E+00	5.31E-04	2.72E-02	1.95E+00	1.70E+00	1.15E+00	1.48E+01	<1
Selenium	1.54E-01	7.23E-04	0.00E+00	3.16E-02	0.00E+00	3.16E-02	9.69E-05	2.27E-04	3.19E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-05	0.00E+00	3.40E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.16E+01	2.33E-03	0.00E+00	6.52E-02	0.00E+00	6.52E-02	3.13E-04	1.71E-02	8.25E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.31E+01	2.54E-02	0.00E+00	4.22E+01	0.00E+00	4.22E+01	3.40E-03	7.83E-02	4.23E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	4.06E-04	5.88E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	8.80E+01	1.16E+00	0.00E+00	1.46E+00	0.00E+00	1.46E+00	1.55E-01	1.30E-01	1.75E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	5.93E-01	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.17E-01	0.00E+00	8.74E-04	1.18E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.12E+00	4.12E-04	0.00E+00	3.64E-01	0.00E+00	3.64E-01	5.51E-05	1.65E-03	5.51E-05	3.65E-01			
Fluoranthene	9.95E+00	1.76E-03	0.00E+00	4.05E+00	0.00E+00	4.05E+00	2.36E-04	1.47E-02	4.07E+00				
Fluorene	4.10E-01	0.00E+00	0.00E+00	5.26E-01	0.00E+00	5.26E-01	0.00E+00	6.05E-04	5.27E-01				
Naphthalene	2.88E-01	5.78E-04	0.00E+00	1.70E-01	0.00E+00	1.70E-01	7.75E-05	4.25E-04	1.70E-01				
Phenanthrene	5.70E+00	5.53E-04	0.00E+00	1.31E+00	0.00E+00	1.31E+00	7.41E-05	8.41E-03	1.32E+00				
Total LMW PAHs						6.54E+00	4.43E-04	2.66E-02	6.57E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	5.48E+00	5.75E-04	0.00E+00	1.17E+00	0.00E+00	1.17E+00	7.71E-05	8.08E-03	1.18E+00				
Benzo[A]Pyrene	5.98E+00	1.94E-03	0.00E+00	1.07E+00	0.00E+00	1.07E+00	2.60E-04	8.81E-03	1.07E+00				
Benzo(b)fluoranthene	7.60E+00	5.09E-03	0.00E+00	2.65E+00	0.00E+00	2.65E+00	6.82E-04	1.12E-02	2.66E+00				
Benzo(g,h,i)perylene	5.37E+00	7.31E-04	0.00E+00	2.12E+00	0.00E+00	2.12E+00	9.79E-05	7.92E-03	2.12E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	6.93E+00	3.69E-03	0.00E+00	2.13E+00	0.00E+00	2.13E+00	4.94E-04	1.02E-02	2.14E+00				
Dibenz(A,H)Anthracene	1.28E+00	6.70E-05	0.00E+00	3.98E-01	0.00E+00	3.98E-01	8.98E-06	1.89E-03	4.00E-01				
Indeno (1,2,3-CD) Pyrene	5.43E+00	3.28E-04	0.00E+00	2.08E+00	0.00E+00	2.08E+00	4.39E-05	8.00E-03	2.09E+00				
Pyrene	9.91E+00	1.33E-03	0.00E+00	2.32E+00	0.00E+00	2.32E+00	1.78E-04	1.46E-02	2.34E+00				
Total HMW PAHs						1.39E+01	1.86E-03	7.07E-02	1.40E+01	6.15E-01	2.28E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.52E-01	5.25E-03	0.00E+00	1.11E+00	0.00E+00	1.11E+00	7.04E-04	2.24E-04	1.11E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.92E-02	0.00E+00	0.00E+00	2.65E-02	0.00E+00	2.65E-02	0.00E+00	2.83E-05	2.66E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H14-11
Refined Exposure Evaluation - Short-tailed Shrew
Main Plant Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	6.17E-08	0.00E+00	0.00E+00	1.38E-08	0.00E+00	1.38E-08	0.00E+00	9.10E-11	1.39E-08				
1,2,3,7,8-PeCDD	3.09E-07	0.00E+00	0.00E+00	9.26E-08	0.00E+00	9.26E-08	0.00E+00	4.56E-10	9.31E-08				
1,2,3,4,7,8-HxCDD	6.41E-07	0.00E+00	0.00E+00	2.19E-07	0.00E+00	2.19E-08	0.00E+00	9.45E-11	2.20E-08				
1,2,3,6,7,8-HxCDD	3.32E-06	0.00E+00	0.00E+00	1.53E-06	0.00E+00	1.53E-07	0.00E+00	4.89E-10	1.54E-07				
1,2,3,7,8,9-HxCDD	1.88E-06	0.00E+00	0.00E+00	7.83E-07	0.00E+00	7.83E-08	0.00E+00	2.77E-10	7.85E-08				
1,2,3,4,6,7,8-HpCDD	9.56E-05	0.00E+00	0.00E+00	8.14E-05	0.00E+00	8.14E-07	0.00E+00	1.41E-09	8.15E-07				
OCDD	1.11E-03	0.00E+00	0.00E+00	1.47E-03	0.00E+00	4.41E-07	0.00E+00	4.89E-10	4.41E-07				
2,3,7,8-TCDF	7.38E-07	0.00E+00	0.00E+00	2.59E-07	0.00E+00	2.59E-08	0.00E+00	1.09E-10	2.60E-08				
1,2,3,7,8-PeCDF	3.90E-07	0.00E+00	0.00E+00	1.22E-07	0.00E+00	3.66E-09	0.00E+00	1.72E-11	3.68E-09				
2,3,4,7,8-PeCDF	5.05E-07	0.00E+00	0.00E+00	1.66E-07	0.00E+00	4.97E-08	0.00E+00	2.23E-10	4.99E-08				
1,2,3,4,7,8-HxCDF	1.92E-06	0.00E+00	0.00E+00	8.02E-07	0.00E+00	8.02E-08	0.00E+00	2.83E-10	8.05E-08				
1,2,3,6,7,8-HxCDF	7.62E-07	0.00E+00	0.00E+00	2.69E-07	0.00E+00	2.69E-08	0.00E+00	1.12E-10	2.70E-08				
2,3,4,6,7,8-HxCDF	1.05E-07	0.00E+00	0.00E+00	2.59E-08	0.00E+00	2.59E-09	0.00E+00	1.55E-11	2.60E-09				
1,2,3,7,8,9-HxCDF	8.42E-07	0.00E+00	0.00E+00	3.03E-07	0.00E+00	3.03E-08	0.00E+00	1.24E-10	3.04E-08				
1,2,3,4,6,7,8-HpCDF	1.50E-05	0.00E+00	0.00E+00	9.11E-06	0.00E+00	9.11E-08	0.00E+00	2.21E-10	9.13E-08				
1,2,3,4,7,8,9-HpCDF	3.35E-07	0.00E+00	0.00E+00	1.02E-07	0.00E+00	1.02E-09	0.00E+00	4.94E-12	1.02E-09				
OCDF	3.25E-05	0.00E+00	0.00E+00	2.27E-05	0.00E+00	6.82E-09	0.00E+00	1.44E-11	6.83E-09				
Total Dioxins/Furans						1.93E-06	0.00E+00	4.43E-09	1.94E-06	5.62E-07	3.45E+00	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	6.57E+00	3.75E-02	2.46E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	9.12E-01	Sample et al. (1999)	Regression ^f	3.67E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	1.97E+02	1.56E-01	3.07E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.79E+01	Sample et al. (1998a)	6.83E-04	1.34E-01	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	6.01E-01	Regression ^a	4.02E-01	USEPA (2007)	4.50E-02	2.70E-02	Sample et al. (1998a)	2.25E-03	1.35E-03	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.97E-03	1.38E+01	4.10E-02	5.66E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	4.23E+00	Sample et al. (1998a)	Regression ^f	1.59E+00	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	7.21E+02	Regression ^a	2.61E+01	Bechtel-Jacobs (1998a)	5.15E-01	3.71E+02	Sample et al. (1998a)	Regression ^f	1.99E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.48E+01	Regression ^a	1.20E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.07E+00	Sample et al. (1999)	Regression ^f	3.55E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	5.11E+02	7.90E-02	4.04E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	3.13E+01	Sample et al. (1999)	2.05E-02	1.05E+01	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.96E-03	2.35E+01	Regression ^a	1.15E+00	Bechtel-Jacobs (1998a)	7.78E-01	1.83E+01	Sample et al. (1998a)	Regression ^f	3.40E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	3.25E-01	Regression ^a	1.47E-01	Bechtel-Jacobs (1998a)	Regression ^d	4.07E-01	Sample et al. (1998a)	Regression ^f	4.32E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	1.11E-01	4.00E-03	4.45E-04	Baes et al. (1984)	5.41E-02	6.02E-03	USCHPPM (2004)	1.08E-01	1.20E-02	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	1.47E+01	4.85E-03	7.11E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.15E-01	Sample et al. (1998a)	1.23E-02	1.80E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	5.60E+01	Regression ^a	4.49E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.20E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	1.18E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	1.40E+02	6.00E-02	8.40E+00	Baes et al. (1984)	1.24E-01	1.74E+01	USCHPPM (2004)	1.60E-02	2.24E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	1.20E+00	8.90E-02	1.07E-01	USEPA (2007a)	2.92E+01	3.51E+01	USEPA (2007a)	2.53E-01	3.03E-01	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	2.24E+00	Regression ^a	1.93E-03	USEPA (2007a)	1.47E+00	3.29E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	4.76E+00	Regression ^a	1.25E+00	USEPA (2007a)	2.42E+00	1.15E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	2.50E+01	5.00E-01	1.25E+01	USEPA (2007a)	3.04E+00	7.60E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	1.92E+00	Regression ^a	2.20E-03	USEPA (2007a)	9.57E+00	1.83E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	4.84E-01	1.22E+01	5.90E+00	USEPA (2007a)	4.40E+00	2.13E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	1.84E+01	Regression ^a	5.15E+00	USEPA (2007a)	1.72E+00	3.16E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	5.75E-04	1.07E+01	Regression ^a	2.72E-01	USEPA (2007a)	1.59E+00	1.70E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H15-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo[A]Pyrene	6.11	1.94E-03	1.09E+01	Regression ^a	1.31E+00	USEPA (2007a)	1.33E+00	1.45E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	1.34E+01	3.10E-01	4.16E+00	USEPA (2007a)	2.60E+00	3.49E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	7.33E+00	Regression ^a	4.16E+00	USEPA (2007a)	2.94E+00	2.16E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	1.21E+01	Regression ^a	2.93E-01	USEPA (2007a)	2.29E+00	2.77E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	2.34E+00	1.30E-01	3.04E-01	USEPA (2007a)	2.31E+00	5.41E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	8.68E+00	1.10E-01	9.55E-01	USEPA (2007a)	2.86E+00	2.48E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	1.63E+01	7.20E-01	1.18E+01	USEPA (2007a)	1.75E+00	2.86E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	2.79E-01	2.38E-02	6.65E-03	USEPA (2007a)	5.44E+01	1.52E+01	USEPA (2007a)	7.79E-01	2.18E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	1.01E+00	1.88E+00	1.90E+00	USEPA (2007a)	6.96E+00	7.04E+00	USEPA (2007a)	5.60E-02	5.67E-02	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	1.56E-02	8.14E-01	1.27E-02	USEPA (2007a)	1.03E+01	1.61E-01	USEPA (2007a)	4.49E-01	7.00E-03	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	2.70E-07	9.41E-02	2.54E-08	USEPA (2007a) ^b	Regression ^d	5.89E-07	Sample et al. (1998a)	Regression ^h	1.35E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	3.20E-07	5.17E-02	1.66E-08	USEPA (2007a) ^b	Regression ^d	7.20E-07	Sample et al. (1998a)	Regression ^h	1.63E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	2.46E-06	2.82E-02	6.94E-08	USEPA (2007a) ^b	Regression ^d	8.03E-06	Sample et al. (1998a)	Regression ^h	1.54E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	1.14E-06	2.82E-02	3.21E-08	USEPA (2007a) ^b	Regression ^d	3.23E-06	Sample et al. (1998a)	Regression ^h	6.59E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	7.63E-05	1.55E-02	1.18E-06	USEPA (2007a) ^b	Regression ^d	4.65E-04	Sample et al. (1998a)	Regression ^h	6.70E-05	Sample et al. (1998b)
OCDD	9.50	0.00E+00	8.91E-04	8.45E-03	7.53E-06	USEPA (2007a) ^b	Regression ^d	8.49E-03	Sample et al. (1998a)	Regression ^h	9.98E-04	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	1.78E-06	1.69E-01	3.02E-07	USEPA (2007a) ^b	Regression ^d	5.47E-06	Sample et al. (1998a)	1.25E-01	2.23E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
2,3,4,7,8-PeCDF	6.94	0.00E+00	9.50E-07	9.24E-02	8.77E-08	USEPA (2007a) ^b	Regression ^d	2.61E-06	Sample et al. (1998a)	1.25E-01	1.19E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	1.67E-06	3.70E-02	6.17E-08	USEPA (2007a) ^b	Regression ^d	5.08E-06	Sample et al. (1998a)	1.25E-01	2.09E-07	Sample et al. (1998b) ⁱ

Table H15-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.80E-07	3.70E-02	2.88E-08	USEPA (2007a) ^b	Regression ^d	2.06E-06	Sample et al. (1998a)	1.25E-01	9.76E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	5.70E-07	5.08E-02	2.90E-08	USEPA (2007a) ^b	Regression ^d	1.42E-06	Sample et al. (1998a)	1.25E-01	7.13E-08	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	5.37E-06	2.77E-02	1.49E-07	USEPA (2007a) ^b	Regression ^d	2.02E-05	Sample et al. (1998a)	1.25E-01	6.72E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	1.68E-05	1.52E-02	2.56E-07	USEPA (2007a) ^b	Regression ^d	7.77E-05	Sample et al. (1998a)	1.25E-01	2.10E-06	Sample et al. (1998b) ⁱ

Table H15-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H15-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	6.80E+00	3.75E-02	2.55E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	9.35E-01	Sample et al. (1999)	Regression ^f	3.77E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	1.44E+02	1.56E-01	2.25E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.31E+01	Sample et al. (1998a)	6.83E-04	9.85E-02	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	7.33E-01	Regression ^a	4.65E-01	USEPA (2007)	4.50E-02	3.30E-02	Sample et al. (1998a)	2.25E-03	1.65E-03	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.97E-03	1.13E+01	4.10E-02	4.61E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	3.44E+00	Sample et al. (1998a)	Regression ^f	1.37E+00	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	1.93E+02	Regression ^a	1.55E+01	Bechtel-Jacobs (1998a)	5.15E-01	9.94E+01	Sample et al. (1998a)	Regression ^f	1.65E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.42E+01	Regression ^a	1.18E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.85E+00	Sample et al. (1999)	Regression ^f	3.49E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	4.83E+02	7.90E-02	3.81E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	3.01E+01	Sample et al. (1999)	2.05E-02	9.89E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.96E-03	6.01E+01	Regression ^a	2.32E+00	Bechtel-Jacobs (1998a)	7.78E-01	4.67E+01	Sample et al. (1998a)	Regression ^f	5.27E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	4.52E-01	Regression ^a	2.12E-01	Bechtel-Jacobs (1998a)	Regression ^d	5.19E-01	Sample et al. (1998a)	Regression ^f	4.89E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	1.73E-01	4.00E-03	6.92E-04	Baes et al. (1984)	5.41E-02	9.36E-03	USCHPPM (2004)	1.08E-01	1.87E-02	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	2.53E+01	4.85E-03	1.23E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	1.06E+00	Sample et al. (1998a)	1.23E-02	3.11E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	5.18E+01	Regression ^a	4.30E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.12E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	1.41E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	1.18E+02	6.00E-02	7.11E+00	Baes et al. (1984)	1.24E-01	1.47E+01	USCHPPM (2004)	1.60E-02	1.90E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	1.03E-01	8.90E-02	9.15E-03	USEPA (2007a)	2.92E+01	3.01E+00	USEPA (2007a)	2.53E-01	2.60E-02	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	2.62E+00	Regression ^a	1.69E-03	USEPA (2007a)	1.47E+00	3.85E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	4.73E+00	Regression ^a	1.25E+00	USEPA (2007a)	2.42E+00	1.14E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	2.43E+01	5.00E-01	1.22E+01	USEPA (2007a)	3.04E+00	7.40E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	2.32E+00	Regression ^a	1.87E-03	USEPA (2007a)	9.57E+00	2.22E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	8.57E-01	1.22E+01	1.05E+01	USEPA (2007a)	4.40E+00	3.77E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	2.22E+01	Regression ^a	5.80E+00	USEPA (2007a)	1.72E+00	3.83E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	5.75E-04	9.59E+00	Regression ^a	2.56E-01	USEPA (2007a)	1.59E+00	1.52E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	8.52E+00	Regression ^a	1.03E+00	USEPA (2007a)	1.33E+00	1.13E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H15-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(b)fluoranthene	6.2	5.09E-03	1.18E+01	3.10E-01	3.64E+00	USEPA (2007a)	2.60E+00	3.06E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	5.89E+00	Regression ^a	3.21E+00	USEPA (2007a)	2.94E+00	1.73E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	1.28E+01	Regression ^a	3.03E-01	USEPA (2007a)	2.29E+00	2.93E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	2.13E+00	1.30E-01	2.77E-01	USEPA (2007a)	2.31E+00	4.92E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	6.73E+00	1.10E-01	7.41E-01	USEPA (2007a)	2.86E+00	1.93E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	1.39E+01	7.20E-01	1.00E+01	USEPA (2007a)	1.75E+00	2.44E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	7.86E-02	2.38E-02	1.87E-03	USEPA (2007a)	5.44E+01	4.28E+00	USEPA (2007a)	7.79E-01	6.12E-02	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	0.00E+00	1.36E+00	1.88E+00	2.55E+00	USEPA (2007a)	6.96E+00	9.45E+00	USEPA (2007a)	5.60E-02	7.61E-02	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	8.43E-03	8.14E-01	6.86E-03	USEPA (2007a)	1.03E+01	8.69E-02	USEPA (2007a)	4.49E-01	3.78E-03	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	2.70E-07	9.41E-02	2.54E-08	USEPA (2007a) ^b	Regression ^d	5.89E-07	Sample et al. (1998a)	Regression ^h	1.35E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	3.20E-07	5.17E-02	1.66E-08	USEPA (2007a) ^b	Regression ^d	7.20E-07	Sample et al. (1998a)	Regression ^h	1.63E-07	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	2.46E-06	2.82E-02	6.94E-08	USEPA (2007a) ^b	Regression ^d	8.03E-06	Sample et al. (1998a)	Regression ^h	1.54E-06	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	1.14E-06	2.82E-02	3.21E-08	USEPA (2007a) ^b	Regression ^d	3.23E-06	Sample et al. (1998a)	Regression ^h	6.59E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	7.63E-05	1.55E-02	1.18E-06	USEPA (2007a) ^b	Regression ^d	4.65E-04	Sample et al. (1998a)	Regression ^h	6.70E-05	Sample et al. (1998b)
OCDD	9.50	0.00E+00	8.91E-04	8.45E-03	7.53E-06	USEPA (2007a) ^b	Regression ^d	8.49E-03	Sample et al. (1998a)	Regression ^h	9.98E-04	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	1.78E-06	1.69E-01	3.02E-07	USEPA (2007a) ^b	Regression ^d	5.47E-06	Sample et al. (1998a)	1.25E-01	2.23E-07	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	9.50E-07	9.24E-02	8.77E-08	USEPA (2007a) ^b	Regression ^d	2.61E-06	Sample et al. (1998a)	1.25E-01	1.19E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	1.67E-06	3.70E-02	6.17E-08	USEPA (2007a) ^b	Regression ^d	5.08E-06	Sample et al. (1998a)	1.25E-01	2.09E-07	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.80E-07	3.70E-02	2.88E-08	USEPA (2007a) ^b	Regression ^d	2.06E-06	Sample et al. (1998a)	1.25E-01	9.76E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H15-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	5.70E-07	5.08E-02	2.90E-08	USEPA (2007a) ^b	Regression ^d	1.42E-06	Sample et al. (1998a)	1.25E-01	7.13E-08	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	5.37E-06	2.77E-02	1.49E-07	USEPA (2007a) ^b	Regression ^d	2.02E-05	Sample et al. (1998a)	1.25E-01	6.72E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	1.68E-05	1.52E-02	2.56E-07	USEPA (2007a) ^b	Regression ^d	7.77E-05	Sample et al. (1998a)	1.25E-01	2.10E-06	Sample et al. (1998b) ⁱ

Table H15-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Central Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H15-2
Refined Exposure Evaluation - American Woodcock
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	0.00E+00	1.09E-04	No TRV	--	No TRV	--
Arsenic	6.57E+00	9.37E-04	2.89E-03	9.64E-02	0.00E+00	9.93E-02	1.10E-04	5.79E-02	1.57E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.97E+02	1.73E-01	3.60E-01	1.89E+00	0.00E+00	2.25E+00	2.03E-02	1.73E+00	4.00E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	6.01E-01	2.61E-04	4.73E-03	2.86E-03	0.00E+00	7.59E-03	3.07E-05	5.30E-03	1.29E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.99E-05	0.00E+00	7.99E-05	1.47E+00	<1	6.35E+00	<1
Chromium	1.38E+01	2.97E-03	6.65E-03	4.47E-01	0.00E+00	4.53E-01	3.49E-04	1.22E-01	5.75E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-04	0.00E+00	2.09E-04	7.61E+00	<1	2.02E+01	<1
Copper	7.21E+02	9.09E-03	3.06E-01	3.93E+01	0.00E+00	3.96E+01	1.07E-03	6.35E+00	4.59E+01	4.05E+00	1.13E+01	3.48E+01	1.32E+00
Lead	1.48E+01	1.75E-03	1.41E-02	7.48E-01	0.00E+00	7.62E-01	2.06E-04	1.30E-01	8.93E-01	1.63E+00	<1	4.46E+01	<1
Manganese	5.11E+02	1.34E-01	4.74E-01	3.31E+00	0.00E+00	3.79E+00	1.58E-02	4.50E+00	8.31E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.72E-05	--	1.72E-05	4.50E-01	<1	9.10E-01	<1
Nickel	2.35E+01	3.96E-03	1.35E-02	1.93E+00	0.00E+00	1.95E+00	4.65E-04	2.07E-01	2.16E+00	6.71E+00	<1	1.86E+01	<1
Selenium	3.25E-01	7.23E-04	1.73E-03	4.30E-02	0.00E+00	4.48E-02	8.49E-05	2.86E-03	4.77E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.11E-01	2.54E-04	5.23E-06	6.37E-04	0.00E+00	6.42E-04	2.98E-05	9.81E-04	1.65E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.47E+01	2.33E-03	8.35E-04	6.51E-02	0.00E+00	6.59E-02	2.74E-04	1.29E-01	1.95E-01	3.44E-01	<1	1.70E+00	<1
Zinc	5.60E+01	2.54E-02	5.28E-01	3.39E+01	0.00E+00	3.44E+01	2.98E-03	4.93E-01	3.49E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.18E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	1.04E-02	1.52E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	1.40E+02	1.16E+00	9.87E-02	1.84E+00	0.00E+00	1.93E+00	1.36E-01	1.23E+00	3.30E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	1.25E-03	3.71E+00	0.00E+00	3.71E+00	0.00E+00	1.06E-02	3.72E+00	1.80E-01	2.07E+01	1.80E+00	2.07E+00
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.24E+00	0.00E+00	2.27E-05	3.48E-01	0.00E+00	3.48E-01	0.00E+00	1.97E-02	3.68E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.76E+00	4.12E-04	1.47E-02	1.22E+00	0.00E+00	1.23E+00	4.83E-05	4.19E-02	1.27E+00				
Fluoranthene	2.50E+01	1.76E-03	1.47E-01	8.04E+00	0.00E+00	8.19E+00	2.07E-04	2.20E-01	8.41E+00				
Fluorene	1.92E+00	0.00E+00	2.59E-05	1.94E+00	0.00E+00	1.94E+00	0.00E+00	1.69E-02	1.96E+00				
Naphthalene	4.84E-01	5.78E-04	6.93E-02	2.25E-01	0.00E+00	2.94E-01	6.79E-05	4.26E-03	2.99E-01				
Phenanthrene	1.84E+01	5.53E-04	6.06E-02	3.35E+00	0.00E+00	3.41E+00	6.50E-05	1.62E-01	3.57E+00				
Total LMW PAHs						1.54E+01	3.88E-04	4.65E-01	1.59E+01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.07E+01	5.75E-04	3.20E-03	1.79E+00	0.00E+00	1.80E+00	6.76E-05	9.39E-02	1.89E+00				
Benzo[A]Pyrene	1.09E+01	1.94E-03	1.54E-02	1.54E+00	0.00E+00	1.55E+00	2.28E-04	9.62E-02	1.65E+00				
Benzo(b)fluoranthene	1.34E+01	5.09E-03	4.88E-02	3.69E+00	0.00E+00	3.73E+00	5.98E-04	1.18E-01	3.85E+00				
Benzo(g,h,i)perylene	7.33E+00	7.31E-04	4.89E-02	2.28E+00	0.00E+00	2.33E+00	8.58E-05	6.46E-02	2.39E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	1.21E+01	3.69E-03	3.44E-03	2.92E+00	0.00E+00	2.93E+00	4.33E-04	1.06E-01	3.04E+00				
Dibenz(A,H)Anthracene	2.34E+00	6.70E-05	3.58E-03	5.72E-01	0.00E+00	5.75E-01	7.87E-06	2.06E-02	5.96E-01				
Indeno (1,2,3-CD) Pyrene	8.68E+00	3.28E-04	1.12E-02	2.63E+00	0.00E+00	2.64E+00	3.85E-05	7.65E-02	2.71E+00				
Pyrene	1.63E+01	1.33E-03	1.38E-01	3.02E+00	0.00E+00	3.16E+00	1.56E-04	1.44E-01	3.31E+00				
Total HMW PAHs						1.87E+01	1.63E-03	7.20E-01	1.94E+01	2.00E+00	9.72E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.79E-01	5.25E-03	7.81E-05	1.61E+00	0.00E+00	1.61E+00	6.17E-04	2.46E-03	1.61E+00	1.10E+00	1.46E+00	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.01E+00	0.00E+00	2.24E-02	7.45E-01	0.00E+00	7.67E-01	0.00E+00	8.92E-03	7.76E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.56E-02	ND	1.49E-04	1.70E-02	0.00E+00	1.71E-02	--	1.37E-04	1.73E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H15-2
Refined Exposure Evaluation - American Woodcock
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	2.98E-10	6.23E-08	0.00E+00	6.26E-08	0.00E+00	2.38E-09	6.50E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	1.95E-10	7.61E-08	0.00E+00	7.63E-08	0.00E+00	2.82E-09	7.92E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	8.15E-10	8.49E-07	0.00E+00	8.49E-09	0.00E+00	2.17E-10	8.71E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	3.78E-10	3.42E-07	0.00E+00	3.42E-08	0.00E+00	1.00E-09	3.52E-08				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.39E-08	4.92E-05	0.00E+00	4.92E-08	0.00E+00	6.72E-10	4.99E-08				
OCDD	8.91E-04	0.00E+00	8.84E-08	8.98E-04	0.00E+00	8.98E-08	0.00E+00	7.85E-10	9.06E-08				
2,3,7,8-TCDF	1.78E-06	0.00E+00	3.54E-09	5.79E-07	0.00E+00	5.82E-07	0.00E+00	1.57E-08	5.98E-07				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.03E-09	2.76E-07	0.00E+00	2.77E-07	0.00E+00	8.37E-09	2.85E-07				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	7.25E-10	5.37E-07	0.00E+00	5.38E-08	0.00E+00	1.47E-09	5.52E-08				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	3.39E-10	2.18E-07	0.00E+00	2.19E-08	0.00E+00	6.87E-10	2.25E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	3.40E-10	1.51E-07	0.00E+00	1.51E-08	0.00E+00	5.02E-10	1.56E-08				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	1.75E-09	2.14E-06	0.00E+00	2.14E-08	0.00E+00	4.73E-10	2.18E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	3.00E-09	8.22E-06	0.00E+00	8.22E-10	0.00E+00	1.48E-11	8.37E-10				
Total Dioxins/Furans						1.29E-06	0.00E+00	3.51E-08	1.29E-06	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-3
Refined Exposure Evaluation - Mourning Dove
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	1.06E-04	No TRV	--	No TRV	--
Arsenic	6.57E+00	9.37E-04	2.81E-02	0.00E+00	0.00E+00	2.81E-02	1.07E-04	5.10E-02	7.92E-02	2.24E+00	<1	4.51E+00	<1
Barium	1.97E+02	1.73E-01	3.50E+00	0.00E+00	0.00E+00	3.50E+00	1.97E-02	1.53E+00	5.05E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	6.01E-01	2.61E-04	4.59E-02	0.00E+00	0.00E+00	4.59E-02	2.98E-05	4.66E-03	5.06E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.76E-05	0.00E+00	7.76E-05	1.47E+00	<1	6.35E+00	<1
Chromium	1.38E+01	2.97E-03	6.46E-02	0.00E+00	0.00E+00	6.46E-02	3.39E-04	1.07E-01	1.72E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-04	0.00E+00	2.03E-04	7.61E+00	<1	2.02E+01	<1
Copper	7.21E+02	9.09E-03	2.98E+00	0.00E+00	0.00E+00	2.98E+00	1.04E-03	5.59E+00	8.57E+00	4.05E+00	2.12E+00	3.48E+01	<1
Lead	1.48E+01	1.75E-03	1.37E-01	0.00E+00	0.00E+00	1.37E-01	2.00E-04	1.15E-01	2.52E-01	1.63E+00	<1	4.46E+01	<1
Manganese	5.11E+02	1.34E-01	4.61E+00	0.00E+00	0.00E+00	4.61E+00	1.53E-02	3.97E+00	8.59E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.67E-05	--	1.67E-05	4.50E-01	<1	9.10E-01	<1
Nickel	2.35E+01	3.96E-03	1.31E-01	0.00E+00	0.00E+00	1.31E-01	4.52E-04	1.83E-01	3.14E-01	6.71E+00	<1	1.86E+01	<1
Selenium	3.25E-01	7.23E-04	1.68E-02	0.00E+00	0.00E+00	1.68E-02	8.25E-05	2.52E-03	1.94E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.11E-01	2.54E-04	5.08E-05	0.00E+00	0.00E+00	5.08E-05	2.90E-05	8.64E-04	9.44E-04	3.50E-01	<1	3.50E+00	<1
Vanadium	1.47E+01	2.33E-03	8.11E-03	0.00E+00	0.00E+00	8.11E-03	2.66E-04	1.14E-01	1.22E-01	3.44E-01	<1	1.70E+00	<1
Zinc	5.60E+01	2.54E-02	5.13E+00	0.00E+00	0.00E+00	5.13E+00	2.89E-03	4.34E-01	5.56E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.18E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	9.16E-03	1.38E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	1.40E+02	1.16E+00	9.59E-01	0.00E+00	0.00E+00	9.59E-01	1.32E-01	1.09E+00	2.18E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	1.22E-02	0.00E+00	0.00E+00	1.22E-02	0.00E+00	9.31E-03	2.15E-02	1.80E-01	<1	1.80E+00	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.24E+00	0.00E+00	2.20E-04	0.00E+00	0.00E+00	2.20E-04	0.00E+00	1.74E-02	1.76E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.76E+00	4.12E-04	1.43E-01	0.00E+00	0.00E+00	1.43E-01	4.70E-05	3.69E-02	1.80E-01				
Fluoranthene	2.50E+01	1.76E-03	1.43E+00	0.00E+00	0.00E+00	1.43E+00	2.01E-04	1.94E-01	1.62E+00				
Fluorene	1.92E+00	0.00E+00	2.51E-04	0.00E+00	0.00E+00	2.51E-04	0.00E+00	1.49E-02	1.51E-02				
Naphthalene	4.84E-01	5.78E-04	6.74E-01	0.00E+00	0.00E+00	6.74E-01	6.60E-05	3.76E-03	6.78E-01				
Phenanthrene	1.84E+01	5.53E-04	5.88E-01	0.00E+00	0.00E+00	5.88E-01	6.31E-05	1.43E-01	7.31E-01				
Total LMW PAHs						2.83E+00	3.77E-04	4.10E-01	3.24E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.07E+01	5.75E-04	3.11E-02	0.00E+00	0.00E+00	3.11E-02	6.56E-05	8.27E-02	1.14E-01				
Benzo[A]Pyrene	1.09E+01	1.94E-03	1.49E-01	0.00E+00	0.00E+00	1.49E-01	2.21E-04	8.47E-02	2.34E-01				
Benzo(b)fluoranthene	1.34E+01	5.09E-03	4.74E-01	0.00E+00	0.00E+00	4.74E-01	5.81E-04	1.04E-01	5.79E-01				
Benzo(g,h,i)perylene	7.33E+00	7.31E-04	4.75E-01	0.00E+00	0.00E+00	4.75E-01	8.34E-05	5.69E-02	5.32E-01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	1.21E+01	3.69E-03	3.35E-02	0.00E+00	0.00E+00	3.35E-02	4.21E-04	9.38E-02	1.28E-01				
Dibenz(A,H)Anthracene	2.34E+00	6.70E-05	3.47E-02	0.00E+00	0.00E+00	3.47E-02	7.65E-06	1.82E-02	5.29E-02				
Indeno (1,2,3-CD) Pyrene	8.68E+00	3.28E-04	1.09E-01	0.00E+00	0.00E+00	1.09E-01	3.74E-05	6.74E-02	1.76E-01				
Pyrene	1.63E+01	1.33E-03	1.34E+00	0.00E+00	0.00E+00	1.34E+00	1.52E-04	1.27E-01	1.47E+00				
Total HMW PAHs						2.65E+00	1.59E-03	6.35E-01	3.29E+00	2.00E+00	1.64E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.79E-01	5.25E-03	7.59E-04	0.00E+00	0.00E+00	7.59E-04	5.99E-04	2.17E-03	3.53E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.01E+00	0.00E+00	2.17E-01	0.00E+00	0.00E+00	2.17E-01	0.00E+00	7.86E-03	2.25E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.56E-02	0.00E+00	1.45E-03	0.00E+00	0.00E+00	1.45E-03	0.00E+00	1.21E-04	1.57E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H15-3
Refined Exposure Evaluation - Mourning Dove
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	2.90E-09	0.00E+00	0.00E+00	2.90E-09	0.00E+00	2.10E-09	5.00E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	1.89E-09	0.00E+00	0.00E+00	1.89E-09	0.00E+00	2.48E-09	4.37E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	7.92E-09	0.00E+00	0.00E+00	7.92E-11	0.00E+00	1.91E-10	2.70E-10				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	3.67E-09	0.00E+00	0.00E+00	3.67E-10	0.00E+00	8.85E-10	1.25E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.35E-07	0.00E+00	0.00E+00	1.35E-10	0.00E+00	5.92E-10	7.27E-10				
OCDD	8.91E-04	0.00E+00	8.59E-07	0.00E+00	0.00E+00	8.59E-11	0.00E+00	6.92E-10	7.77E-10				
2,3,7,8-TCDF	1.78E-06	0.00E+00	3.44E-08	0.00E+00	0.00E+00	3.44E-08	0.00E+00	1.38E-08	4.83E-08				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.00E-08	0.00E+00	0.00E+00	1.00E-08	0.00E+00	7.37E-09	1.74E-08				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	7.05E-09	0.00E+00	0.00E+00	7.05E-10	0.00E+00	1.30E-09	2.00E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	3.29E-09	0.00E+00	0.00E+00	3.29E-10	0.00E+00	6.05E-10	9.35E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	3.30E-09	0.00E+00	0.00E+00	3.30E-10	0.00E+00	4.42E-10	7.73E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	1.70E-08	0.00E+00	0.00E+00	1.70E-10	0.00E+00	4.17E-10	5.86E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	2.92E-08	0.00E+00	0.00E+00	2.92E-12	0.00E+00	1.30E-11	1.60E-11				
Total Dioxins/Furans						5.14E-08	0.00E+00	3.09E-08	8.23E-08	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-4
Refined Exposure Evaluation - Red-tailed Hawk
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E-05	0.00E+00	7.61E-05	No TRV	--	No TRV	--
Arsenic	6.57E+00	9.37E-04	0.00E+00	0.00E+00	3.01E-03	3.01E-03	7.68E-05	1.40E-02	1.71E-02	2.24E+00	<1	4.51E+00	<1
Barium	1.97E+02	1.73E-01	0.00E+00	0.00E+00	1.10E-02	1.10E-02	1.42E-02	4.19E-01	4.44E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	6.01E-01	2.61E-04	0.00E+00	0.00E+00	1.11E-04	1.11E-04	2.14E-05	1.28E-03	1.41E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.58E-05	0.00E+00	5.58E-05	1.47E+00	<1	6.35E+00	<1
Chromium	1.38E+01	2.97E-03	0.00E+00	0.00E+00	1.31E-01	1.31E-01	2.44E-04	2.94E-02	1.60E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-04	0.00E+00	1.46E-04	7.61E+00	<1	2.02E+01	<1
Copper	7.21E+02	9.09E-03	0.00E+00	0.00E+00	1.63E+00	1.63E+00	7.45E-04	1.54E+00	3.17E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.48E+01	1.75E-03	0.00E+00	0.00E+00	2.91E-01	2.91E-01	1.44E-04	3.16E-02	3.23E-01	1.63E+00	<1	4.46E+01	<1
Manganese	5.11E+02	1.34E-01	0.00E+00	0.00E+00	8.59E-01	8.59E-01	1.10E-02	1.09E+00	1.96E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.20E-05	--	1.20E-05	4.50E-01	<1	9.10E-01	<1
Nickel	2.35E+01	3.96E-03	0.00E+00	0.00E+00	2.79E-01	2.79E-01	3.25E-04	5.02E-02	3.30E-01	6.71E+00	<1	1.86E+01	<1
Selenium	3.25E-01	7.23E-04	0.00E+00	0.00E+00	3.54E-02	3.54E-02	5.93E-05	6.93E-04	3.62E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.11E-01	2.54E-04	0.00E+00	0.00E+00	9.88E-04	9.88E-04	2.08E-05	2.37E-04	1.25E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.47E+01	2.33E-03	0.00E+00	0.00E+00	1.48E-02	1.48E-02	1.91E-04	3.12E-02	4.62E-02	3.44E-01	<1	1.70E+00	<1
Zinc	5.60E+01	2.54E-02	0.00E+00	0.00E+00	8.55E+00	8.55E+00	2.08E-03	1.19E-01	8.68E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.18E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	2.52E-03	5.86E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.40E+02	1.16E+00	0.00E+00	0.00E+00	1.84E-01	1.84E-01	9.49E-02	2.99E-01	5.77E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-02	2.49E-02	0.00E+00	2.56E-03	2.74E-02	1.80E-01	<1	1.80E+00	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.77E-03	4.77E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.76E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-02	3.37E-05	1.01E-02		1.02E-02	
Fluoranthene	2.50E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-04	5.33E-02	5.35E-02				
Fluorene	1.92E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-03	4.09E-03				
Naphthalene	4.84E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E-05	1.03E-03	1.08E-03				
Phenanthrene	1.84E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-05	3.92E-02	3.93E-02				
Total LMW PAHs						0.00E+00	2.71E-04	1.13E-01	1.13E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.07E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-05	2.27E-02	2.28E-02				
Benzo[A]Pyrene	1.09E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	2.33E-02	2.34E-02				
Benzo(b)fluoranthene	1.34E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-04	2.86E-02	2.90E-02				
Benzo(g,h,i)perylene	7.33E+00	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-05	1.56E-02	1.57E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	1.21E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-04	2.58E-02	2.61E-02				
Dibenz(A,H)Anthracene	2.34E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-06	4.99E-03	5.00E-03				
Indeno (1,2,3-CD) Pyrene	8.68E+00	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.69E-05	1.85E-02	1.85E-02				
Pyrene	1.63E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	3.48E-02	3.50E-02				
Total HMW PAHs						0.00E+00	1.14E-03	1.74E-01	1.75E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.79E-01	5.25E-03	0.00E+00	0.00E+00	1.78E-02	1.78E-02	4.31E-04	5.96E-04	1.89E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.01E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-03	4.65E-03	0.00E+00	2.16E-03	6.81E-03	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.56E-02	0.00E+00	0.00E+00	0.00E+00	5.74E-04	5.74E-04	0.00E+00	3.32E-05	6.07E-04	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H15-4
Refined Exposure Evaluation - Red-tailed Hawk
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	1.11E-08	1.11E-08	0.00E+00	5.76E-10	1.17E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	1.34E-08	1.34E-08	0.00E+00	6.82E-10	1.41E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	1.26E-07	1.26E-09	0.00E+00	5.25E-11	1.31E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	5.41E-08	5.41E-09	0.00E+00	2.43E-10	5.65E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	5.49E-06	5.49E-09	0.00E+00	1.63E-10	5.66E-09				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	8.19E-05	8.19E-09	0.00E+00	1.90E-10	8.38E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	1.83E-08	1.83E-08	0.00E+00	3.80E-09	2.21E-08				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	9.75E-09	9.75E-09	0.00E+00	2.03E-09	1.18E-08				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	1.71E-08	1.71E-09	0.00E+00	3.56E-10	2.07E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	8.00E-09	8.00E-10	0.00E+00	1.66E-10	9.67E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	5.85E-09	5.85E-10	0.00E+00	1.22E-10	7.06E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	5.51E-08	5.51E-10	0.00E+00	1.15E-10	6.65E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	1.72E-07	1.72E-11	0.00E+00	3.58E-12	2.08E-11				
Total Dioxins/Furans						7.65E-08	0.00E+00	8.49E-09	8.50E-08	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-04	0.00E+00	1.47E-04	No TRV	--	No TRV	--
Arsenic	6.57E+00	9.37E-04	0.00E+00	1.44E-01	0.00E+00	1.44E-01	1.48E-04	0.00E+00	1.45E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.97E+02	1.73E-01	0.00E+00	2.83E+00	0.00E+00	2.83E+00	2.74E-02	0.00E+00	2.86E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	6.01E-01	2.61E-04	0.00E+00	4.28E-03	0.00E+00	4.28E-03	4.13E-05	0.00E+00	4.32E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-04	0.00E+00	1.08E-04	1.47E+00	<1	6.35E+00	<1
Chromium	1.38E+01	2.97E-03	0.00E+00	6.69E-01	0.00E+00	6.69E-01	4.71E-04	0.00E+00	6.70E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	0.00E+00	2.82E-04	7.61E+00	<1	2.02E+01	<1
Copper	7.21E+02	9.09E-03	0.00E+00	5.88E+01	0.00E+00	5.88E+01	1.44E-03	0.00E+00	5.88E+01	4.05E+00	1.45E+01	3.48E+01	1.69E+00
Lead	1.48E+01	1.75E-03	0.00E+00	1.12E+00	0.00E+00	1.12E+00	2.77E-04	0.00E+00	1.12E+00	1.63E+00	<1	4.46E+01	<1
Manganese	5.11E+02	1.34E-01	0.00E+00	4.96E+00	0.00E+00	4.96E+00	2.13E-02	0.00E+00	4.98E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.31E-05	--	2.31E-05	4.50E-01	<1	9.10E-01	<1
Nickel	2.35E+01	3.96E-03	0.00E+00	2.90E+00	0.00E+00	2.90E+00	6.27E-04	0.00E+00	2.90E+00	6.71E+00	<1	1.86E+01	<1
Selenium	3.25E-01	7.23E-04	0.00E+00	6.45E-02	0.00E+00	6.45E-02	1.14E-04	0.00E+00	6.46E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.11E-01	2.54E-04	0.00E+00	9.54E-04	0.00E+00	9.54E-04	4.02E-05	0.00E+00	9.94E-04	3.50E-01	<1	3.50E+00	<1
Vanadium	1.47E+01	2.33E-03	0.00E+00	9.74E-02	0.00E+00	9.74E-02	3.70E-04	0.00E+00	9.78E-02	3.44E-01	<1	1.70E+00	<1
Zinc	5.60E+01	2.54E-02	0.00E+00	5.07E+01	0.00E+00	5.07E+01	4.01E-03	0.00E+00	5.07E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.18E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.40E+02	1.16E+00	0.00E+00	2.75E+00	0.00E+00	2.75E+00	1.83E-01	0.00E+00	2.93E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	1.20E+00	0.00E+00	0.00E+00	5.56E+00	0.00E+00	5.56E+00	0.00E+00	0.00E+00	5.56E+00	1.80E-01	3.09E+01	1.80E+00	3.09E+00
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.24E+00	0.00E+00	0.00E+00	5.21E-01	0.00E+00	5.21E-01	0.00E+00	0.00E+00	5.21E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.76E+00	4.12E-04	0.00E+00	1.82E+00	0.00E+00	1.82E+00	1.82E-05	0.00E+00	6.52E+00				
Fluoranthene	2.50E+01	1.76E-03	0.00E+00	1.20E+01	0.00E+00	1.20E+01	2.79E-04	0.00E+00	1.20E+01				
Fluorene	1.92E+00	0.00E+00	0.00E+00	2.91E+00	0.00E+00	2.91E+00	0.00E+00	0.00E+00	2.91E+00				
Naphthalene	4.84E-01	5.78E-04	0.00E+00	3.37E-01	0.00E+00	3.37E-01	9.15E-05	0.00E+00	3.37E-01				
Phenanthrene	1.84E+01	5.53E-04	0.00E+00	5.01E+00	0.00E+00	5.01E+00	8.76E-05	0.00E+00	5.01E+00				
Total LMW PAHs						2.26E+01	5.23E-04	0.00E+00	2.26E+01	1.61E+01	1.41E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.07E+01	5.75E-04	0.00E+00	2.68E+00	0.00E+00	2.68E+00	9.11E-05	0.00E+00	2.68E+00				
Benzo[A]Pyrene	1.09E+01	1.94E-03	0.00E+00	2.30E+00	0.00E+00	2.30E+00	3.07E-04	0.00E+00	2.30E+00				
Benzo(b)fluoranthene	1.34E+01	5.09E-03	0.00E+00	5.52E+00	0.00E+00	5.52E+00	8.06E-04	0.00E+00	5.52E+00				
Benzo(g,h,i)perylene	7.33E+00	7.31E-04	0.00E+00	3.41E+00	0.00E+00	3.41E+00	1.16E-04	0.00E+00	3.41E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	1.21E+01	3.69E-03	0.00E+00	4.38E+00	0.00E+00	4.38E+00	5.84E-04	0.00E+00	4.38E+00				
Dibenz(A,H)Anthracene	2.34E+00	6.70E-05	0.00E+00	8.56E-01	0.00E+00	8.56E-01	1.06E-05	0.00E+00	8.56E-01				
Indeno (1,2,3-CD) Pyrene	8.68E+00	3.28E-04	0.00E+00	3.93E+00	0.00E+00	3.93E+00	5.19E-05	0.00E+00	3.93E+00				
Pyrene	1.63E+01	1.33E-03	0.00E+00	4.53E+00	0.00E+00	4.53E+00	2.11E-04	0.00E+00	4.53E+00				
Total HMW PAHs						2.76E+01	2.20E-03	0.00E+00	2.76E+01	2.00E+00	1.38E+01	2.00E+01	1.38E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.79E-01	5.25E-03	0.00E+00	2.41E+00	0.00E+00	2.41E+00	8.31E-04	0.00E+00	2.41E+00	1.10E+00	2.19E+00	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	1.01E+00	0.00E+00	0.00E+00	1.12E+00	0.00E+00	1.12E+00	0.00E+00	0.00E+00	1.12E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.56E-02	0.00E+00	0.00E+00	2.55E-02	0.00E+00	2.55E-02	0.00E+00	0.00E+00	2.55E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H15-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	9.33E-08	0.00E+00	9.33E-08	0.00E+00	0.00E+00	9.33E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	1.14E-07	0.00E+00	1.14E-07	0.00E+00	0.00E+00	1.14E-07				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	1.27E-06	0.00E+00	1.27E-08	0.00E+00	0.00E+00	1.27E-08				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	5.12E-07	0.00E+00	5.12E-08	0.00E+00	0.00E+00	5.12E-08				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	7.36E-05	0.00E+00	7.36E-08	0.00E+00	0.00E+00	7.36E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	1.34E-03	0.00E+00	1.34E-07	0.00E+00	0.00E+00	1.34E-07				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	8.67E-07	0.00E+00	8.67E-07	0.00E+00	0.00E+00	8.67E-07				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	4.13E-07	0.00E+00	4.13E-07	0.00E+00	0.00E+00	4.13E-07				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	8.04E-07	0.00E+00	8.04E-08	0.00E+00	0.00E+00	8.04E-08				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	3.27E-07	0.00E+00	3.27E-08	0.00E+00	0.00E+00	3.27E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	2.26E-07	0.00E+00	2.26E-08	0.00E+00	0.00E+00	2.26E-08				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	3.20E-06	0.00E+00	3.20E-08	0.00E+00	0.00E+00	3.20E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	1.23E-05	0.00E+00	1.23E-09	0.00E+00	0.00E+00	1.23E-09				
Total Dioxins/Furans						1.93E-06	0.00E+00	0.00E+00	1.93E-06	1.75E-06	1.10E+00	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-6
Refined Exposure Evaluation - Canada Lynx
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-05	0.00E+00	2.90E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.57E+00	9.37E-04	0.00E+00	0.00E+00	1.15E-03	1.15E-03	2.93E-05	5.74E-03	6.92E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.97E+02	1.73E-01	0.00E+00	0.00E+00	4.19E-03	4.19E-03	5.40E-03	1.72E-01	1.82E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.01E-01	2.61E-04	0.00E+00	0.00E+00	4.22E-05	4.22E-05	8.15E-06	5.26E-04	5.76E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-05	0.00E+00	2.12E-05	7.70E-01	<1	6.87E+00	<1
Chromium	1.38E+01	2.97E-03	0.00E+00	0.00E+00	4.98E-02	4.98E-02	9.29E-05	1.21E-02	6.20E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.56E-05	0.00E+00	5.56E-05	7.33E+00	<1	1.89E+01	<1
Copper	7.21E+02	9.09E-03	0.00E+00	0.00E+00	6.23E-01	6.23E-01	2.84E-04	6.31E-01	1.25E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.48E+01	1.75E-03	0.00E+00	0.00E+00	1.11E-01	1.11E-01	5.47E-05	1.29E-02	1.24E-01	4.70E+00	<1	1.86E+02	<1
Manganese	5.11E+02	1.34E-01	0.00E+00	0.00E+00	3.27E-01	3.27E-01	4.20E-03	4.47E-01	7.79E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.56E-06	--	4.56E-06	1.41E+00	<1	1.41E+01	<1
Nickel	2.35E+01	3.96E-03	0.00E+00	0.00E+00	1.06E-01	1.06E-01	1.24E-04	2.06E-02	1.27E-01	1.70E+00	<1	1.48E+01	<1
Selenium	3.25E-01	7.23E-04	0.00E+00	0.00E+00	1.35E-02	1.35E-02	2.26E-05	2.84E-04	1.38E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.11E-01	2.54E-04	0.00E+00	0.00E+00	3.76E-04	3.76E-04	7.94E-06	9.74E-05	4.82E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.47E+01	2.33E-03	0.00E+00	0.00E+00	5.63E-03	5.63E-03	7.29E-05	1.28E-02	1.85E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.60E+01	2.54E-02	0.00E+00	0.00E+00	3.26E+00	3.26E+00	7.92E-04	4.90E-02	3.31E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.18E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	1.03E-03	2.31E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.40E+02	1.16E+00	0.00E+00	0.00E+00	7.00E-02	7.00E-02	3.62E-02	1.23E-01	2.29E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.20E+00	0.00E+00	0.00E+00	0.00E+00	9.48E-03	9.48E-03	0.00E+00	1.05E-03	1.05E-02	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-03	1.96E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.76E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-05	4.16E-03	1.29E-05	4.17E-03			
Fluoranthene	2.50E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-05	2.19E-02	2.19E-02				
Fluorene	1.92E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-03	1.68E-03				
Naphthalene	4.84E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-05	4.23E-04	4.41E-04				
Phenanthrene	1.84E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	1.61E-02	1.61E-02				
Total LMW PAHs						0.00E+00	1.03E-04	4.62E-02	4.63E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.07E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05	9.33E-03	9.34E-03				
Benzo[A]Pyrene	1.09E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-05	9.55E-03	9.61E-03				
Benzo(b)fluoranthene	1.34E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	1.17E-02	1.19E-02				
Benzo(g,h,i)perylene	7.33E+00	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-05	6.41E-03	6.44E-03				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	1.21E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-04	1.06E-02	1.07E-02				
Dibenz(A,H)Anthracene	2.34E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-06	2.05E-03	2.05E-03				
Indeno (1,2,3-CD) Pyrene	8.68E+00	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-05	7.60E-03	7.61E-03				
Pyrene	1.63E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-05	1.43E-02	1.43E-02				
Total HMW PAHs						0.00E+00	4.34E-04	7.15E-02	7.20E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.79E-01	5.25E-03	0.00E+00	0.00E+00	6.80E-03	6.80E-03	1.64E-04	2.44E-04	7.21E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.01E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	1.77E-03	0.00E+00	8.86E-04	2.66E-03	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.56E-02	0.00E+00	0.00E+00	0.00E+00	2.19E-04	2.19E-04	0.00E+00	1.36E-05	2.32E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H15-6
Refined Exposure Evaluation - Canada Lynx
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	4.23E-09	4.23E-09	0.00E+00	2.36E-10	4.46E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	5.10E-09	5.10E-09	0.00E+00	2.80E-10	5.38E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	4.80E-08	4.80E-09	0.00E+00	2.15E-10	5.01E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	2.06E-08	2.06E-09	0.00E+00	9.97E-11	2.16E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	2.09E-06	2.09E-08	0.00E+00	6.68E-10	2.16E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	3.12E-05	9.36E-09	0.00E+00	2.34E-10	9.59E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	6.96E-09	6.96E-10	0.00E+00	1.56E-10	8.51E-10				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	3.71E-09	1.11E-09	0.00E+00	2.49E-10	1.36E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	6.53E-09	6.53E-10	0.00E+00	1.46E-10	7.99E-10				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	3.05E-09	3.05E-10	0.00E+00	6.82E-11	3.73E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	2.23E-09	2.23E-10	0.00E+00	4.99E-11	2.73E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	2.10E-08	2.10E-10	0.00E+00	4.70E-11	2.57E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	6.57E-08	1.97E-11	0.00E+00	4.41E-12	2.41E-11				
Total Dioxins/Furans						4.97E-08	0.00E+00	2.45E-09	5.21E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-7
Refined Exposure Evaluation - Grizzly Bear
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-05	0.00E+00	2.00E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.57E+00	9.37E-04	3.46E-03	2.95E-03	7.92E-05	0.00E+00	6.49E-03	2.02E-05	3.97E-03	1.05E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.97E+02	1.73E-01	4.30E-01	5.79E-02	2.90E-04	0.00E+00	4.89E-01	3.73E-03	1.19E-01	6.11E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.01E-01	2.61E-04	5.65E-03	8.76E-05	2.92E-06	0.00E+00	5.74E-03	5.64E-06	3.63E-04	6.11E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-05	0.00E+00	1.47E-05	7.70E-01	<1	6.87E+00	<1
Chromium	1.38E+01	2.97E-03	7.95E-03	1.37E-02	3.44E-03	0.00E+00	2.51E-02	6.42E-05	8.35E-03	3.35E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-05	0.00E+00	3.84E-05	7.33E+00	<1	1.89E+01	<1
Copper	7.21E+02	9.09E-03	3.66E-01	1.20E+00	4.30E-02	0.00E+00	1.61E+00	1.96E-04	4.36E-01	2.05E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.48E+01	1.75E-03	1.69E-02	2.29E-02	7.67E-03	0.00E+00	4.75E-02	3.78E-05	8.95E-03	5.64E-02	4.70E+00	<1	1.86E+02	<1
Manganese	5.11E+02	1.34E-01	5.67E-01	1.01E-01	2.26E-02	0.00E+00	6.91E-01	2.90E-03	3.09E-01	1.00E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	0.00E+00	3.15E-06	--	3.15E-06	1.41E+00	<1	1.41E+01	<1
Nickel	2.35E+01	3.96E-03	1.61E-02	5.93E-02	7.35E-03	0.00E+00	8.28E-02	8.55E-05	1.42E-02	9.71E-02	1.70E+00	<1	1.48E+01	<1
Selenium	3.25E-01	7.23E-04	2.06E-03	1.32E-03	9.33E-04	0.00E+00	4.32E-03	1.56E-05	1.97E-04	4.53E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.11E-01	2.54E-04	6.25E-06	1.95E-05	2.60E-05	0.00E+00	5.18E-05	5.49E-06	6.73E-05	1.25E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.47E+01	2.33E-03	9.97E-04	1.99E-03	3.89E-04	0.00E+00	3.38E-03	5.04E-05	8.86E-03	1.23E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.60E+01	2.54E-02	6.30E-01	1.04E+00	2.25E-01	0.00E+00	1.89E+00	5.48E-04	3.38E-02	1.93E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.18E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	7.14E-04	1.60E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.40E+02	1.16E+00	1.18E-01	5.63E-02	4.84E-03	0.00E+00	1.79E-01	2.50E-02	8.47E-02	2.89E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.20E+00	0.00E+00	1.50E-03	1.14E-01	6.55E-04	0.00E+00	1.16E-01	0.00E+00	7.26E-04	1.17E-01	6.80E-02	1.71E+00	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	2.24E+00	0.00E+00	2.71E-05	1.07E-02	0.00E+00	0.00E+00	1.07E-02	0.00E+00	1.35E-03	1.20E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.76E+00	4.12E-04	1.76E-02	3.73E-02	0.00E+00	0.00E+00	5.49E-02	8.89E-06	2.88E-03	5.77E-02				
Fluoranthene	2.50E+01	1.76E-03	1.76E-01	2.46E-01	0.00E+00	0.00E+00	4.22E-01	3.80E-05	1.51E-02	4.37E-01				
Fluorene	1.92E+00	0.00E+00	3.09E-05	5.94E-02	0.00E+00	0.00E+00	5.95E-02	0.00E+00	1.16E-03	6.06E-02				
Naphthalene	4.84E-01	5.78E-04	8.29E-02	6.90E-03	0.00E+00	0.00E+00	8.98E-02	1.25E-05	2.93E-04	9.01E-02				
Phenanthrene	1.84E+01	5.53E-04	7.24E-02	1.02E-01	0.00E+00	0.00E+00	1.75E-01	1.19E-05	1.11E-02	1.86E-01				
Total LMW PAHs							8.11E-01	7.13E-05	3.19E-02	8.43E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.07E+01	5.75E-04	3.82E-03	5.49E-02	0.00E+00	0.00E+00	5.87E-02	1.24E-05	6.45E-03	6.52E-02				
Benzo(A)Pyrene	1.09E+01	1.94E-03	1.84E-02	4.70E-02	0.00E+00	0.00E+00	6.54E-02	4.19E-05	6.60E-03	7.21E-02				
Benzo(b)fluoranthene	1.34E+01	5.09E-03	5.83E-02	1.13E-01	0.00E+00	0.00E+00	1.71E-01	1.10E-04	8.11E-03	1.79E-01				
Benzo(g,h,i)perylene	7.33E+00	7.31E-04	5.84E-02	6.98E-02	0.00E+00	0.00E+00	1.28E-01	1.58E-05	4.43E-03	1.33E-01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	1.21E+01	3.69E-03	4.12E-03	8.96E-02	0.00E+00	0.00E+00	9.37E-02	7.96E-05	7.30E-03	1.01E-01				
Dibenz(A,H)Anthracene	2.34E+00	6.70E-05	4.27E-03	1.75E-02	0.00E+00	0.00E+00	2.18E-02	1.45E-06	1.42E-03	2.32E-02				
Indeno (1,2,3-CD) Pyrene	8.68E+00	3.28E-04	1.34E-02	8.05E-02	0.00E+00	0.00E+00	9.39E-02	7.08E-06	5.25E-03	9.91E-02				
Pyrene	1.63E+01	1.33E-03	1.65E-01	9.26E-02	0.00E+00	0.00E+00	2.58E-01	2.87E-05	9.88E-03	2.68E-01				
Total HMW PAHs							8.91E-01	3.00E-04	4.94E-02	9.41E-01	6.15E-01	1.53E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phtthalate	2.79E-01	5.25E-03	9.33E-05	4.92E-02	4.70E-04	0.00E+00	4.98E-02	1.13E-04	1.69E-04	5.01E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphtthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.01E+00	0.00E+00	2.67E-02	2.28E-02	1.23E-04	0.00E+00	4.96E-02	0.00E+00	6.12E-04	5.03E-02	No TRV	--	No TRV	--
Di-n-butyl phtthalate	1.56E-02	0.00E+00	1.78E-04	5.21E-04	1.51E-05	0.00E+00	7.14E-04	0.00E+00	9.43E-06	7.24E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phtthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H15-7
Refined Exposure Evaluation - Grizzly Bear
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	2.70E-07	0.00E+00	3.57E-10	1.91E-09	2.92E-10	0.00E+00	2.56E-09	0.00E+00	1.63E-10	2.72E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	2.32E-10	2.33E-09	3.52E-10	0.00E+00	2.92E-09	0.00E+00	1.93E-10	3.11E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	9.74E-10	2.60E-08	3.32E-09	0.00E+00	3.03E-09	0.00E+00	1.49E-10	3.18E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	4.51E-10	1.05E-08	1.42E-09	0.00E+00	1.23E-09	0.00E+00	6.89E-11	1.30E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.66E-08	1.51E-06	1.45E-07	0.00E+00	1.67E-08	0.00E+00	4.61E-10	1.71E-08				
OCDD	8.91E-04	0.00E+00	1.06E-07	2.75E-05	2.16E-06	0.00E+00	8.93E-09	0.00E+00	1.62E-10	9.09E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	4.23E-09	1.77E-08	4.81E-10	0.00E+00	2.25E-09	0.00E+00	1.08E-10	2.35E-09				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.23E-09	8.44E-09	2.57E-10	0.00E+00	2.98E-09	0.00E+00	1.72E-10	3.15E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	8.67E-10	1.64E-08	4.51E-10	0.00E+00	1.78E-09	0.00E+00	1.01E-10	1.88E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	4.05E-10	6.69E-09	2.11E-10	0.00E+00	7.30E-10	0.00E+00	4.72E-11	7.77E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	4.06E-10	4.62E-09	1.54E-10	0.00E+00	5.18E-10	0.00E+00	3.45E-11	5.52E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	2.09E-09	6.54E-08	1.45E-09	0.00E+00	6.89E-10	0.00E+00	3.25E-11	7.22E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	3.59E-09	2.52E-07	4.54E-09	0.00E+00	7.80E-11	0.00E+00	3.05E-12	8.10E-11				
Total Dioxins/Furans							4.44E-08	0.00E+00	1.70E-09	4.61E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-8
Refined Exposure Evaluation - Long-tailed Weasel
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.78E-05	0.00E+00	4.78E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.80E+00	9.37E-04	0.00E+00	0.00E+00	1.94E-03	1.94E-03	4.82E-05	5.60E-03	7.59E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.44E+02	1.73E-01	0.00E+00	0.00E+00	5.07E-03	5.07E-03	8.90E-03	1.19E-01	1.33E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	7.33E-01	2.61E-04	0.00E+00	0.00E+00	8.48E-05	8.48E-05	1.34E-05	6.03E-04	7.01E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-05	0.00E+00	3.50E-05	7.70E-01	<1	6.87E+00	<1
Chromium	1.13E+01	2.97E-03	0.00E+00	0.00E+00	7.06E-02	7.06E-02	1.53E-04	9.27E-03	8.00E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.15E-05	0.00E+00	9.15E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	9.09E-03	0.00E+00	0.00E+00	8.48E-01	8.48E-01	4.68E-04	1.59E-01	1.01E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.42E+01	1.75E-03	0.00E+00	0.00E+00	1.80E-01	1.80E-01	9.01E-05	1.17E-02	1.91E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.83E+02	1.34E-01	0.00E+00	0.00E+00	5.09E-01	5.09E-01	6.92E-03	3.97E-01	9.13E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	7.51E-06	--	7.51E-06	1.41E+00	<1	1.41E+01	<1
Nickel	6.01E+01	3.96E-03	0.00E+00	0.00E+00	2.71E-01	2.71E-01	2.04E-04	4.95E-02	3.21E-01	1.70E+00	<1	1.48E+01	<1
Selenium	4.52E-01	7.23E-04	0.00E+00	0.00E+00	2.52E-02	2.52E-02	3.72E-05	3.72E-04	2.56E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.73E-01	2.54E-04	0.00E+00	0.00E+00	9.64E-04	9.64E-04	1.31E-05	1.43E-04	1.12E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	2.53E+01	2.33E-03	0.00E+00	0.00E+00	1.60E-02	1.60E-02	1.20E-04	2.08E-02	3.69E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.18E+01	2.54E-02	0.00E+00	0.00E+00	5.34E+00	5.34E+00	1.30E-03	4.27E-02	5.38E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.41E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	1.16E-03	3.26E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.18E+02	1.16E+00	0.00E+00	0.00E+00	9.76E-02	9.76E-02	5.96E-02	9.76E-02	2.55E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.03E-01	0.00E+00	0.00E+00	0.00E+00	1.34E-03	1.34E-03	0.00E+00	8.47E-05	1.42E-03	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-03	2.16E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.73E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-05	3.89E-03	3.91E-03				
Fluoranthene	2.43E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-05	2.00E-02	2.01E-02				
Fluorene	2.32E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-03	1.91E-03				
Naphthalene	8.57E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-05	7.05E-04	7.35E-04				
Phenanthrene	2.22E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-05	1.83E-02	1.83E-02				
Total LMW PAHs						0.00E+00	1.70E-04	4.70E-02	4.72E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.59E+00	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-05	7.90E-03	7.93E-03				
Benzo[A]Pyrene	8.52E+00	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.97E-05	7.01E-03	7.11E-03				
Benzo(b)fluoranthene	1.18E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-04	9.68E-03	9.94E-03				
Benzo(g,h,i)perylene	5.89E+00	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-05	4.85E-03	4.89E-03				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	1.28E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-04	1.05E-02	1.07E-02				
Dibenz(A,H)Anthracene	2.13E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.45E-06	1.75E-03	1.76E-03				
Indeno (1,2,3-CD) Pyrene	6.73E+00	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-05	5.55E-03	5.56E-03				
Pyrene	1.39E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-05	1.15E-02	1.15E-02				
Total HMW PAHs						0.00E+00	7.15E-04	5.87E-02	5.94E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	7.86E-02	5.25E-03	0.00E+00	0.00E+00	3.15E-03	3.15E-03	2.70E-04	6.47E-05	3.48E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.36E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-03	3.92E-03	0.00E+00	1.12E-03	5.03E-03	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.43E-03	0.00E+00	0.00E+00	0.00E+00	1.95E-04	1.95E-04	0.00E+00	6.94E-06	2.02E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H15-8
Refined Exposure Evaluation - Long-tailed Weasel
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	6.97E-09	6.97E-09	0.00E+00	2.22E-10	7.19E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	8.40E-09	8.40E-09	0.00E+00	2.63E-10	8.66E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	7.90E-08	7.90E-09	0.00E+00	2.03E-10	8.11E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	3.39E-08	3.39E-09	0.00E+00	9.39E-11	3.49E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	3.45E-06	3.45E-08	0.00E+00	6.28E-10	3.51E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	5.14E-05	1.54E-08	0.00E+00	2.20E-10	1.56E-08				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	1.15E-08	1.15E-09	0.00E+00	1.47E-10	1.29E-09				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	6.12E-09	1.83E-09	0.00E+00	2.35E-10	2.07E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	1.08E-08	1.08E-09	0.00E+00	1.38E-10	1.21E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	5.02E-09	5.02E-10	0.00E+00	6.42E-11	5.66E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	3.67E-09	3.67E-10	0.00E+00	4.69E-11	4.14E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	3.46E-08	3.46E-10	0.00E+00	4.42E-11	3.90E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	1.08E-07	3.24E-11	0.00E+00	4.15E-12	3.66E-11				
Total Dioxins/Furans						8.18E-08	0.00E+00	2.31E-09	8.42E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-9
Refined Exposure Evaluation - Meadow Vole
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-04	0.00E+00	1.39E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	6.80E+00	9.37E-04	3.83E-02	0.00E+00	0.00E+00	3.83E-02	1.41E-04	1.33E-02	5.17E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.44E+02	1.73E-01	3.38E+00	0.00E+00	0.00E+00	3.38E+00	2.60E-02	2.82E-01	3.69E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	7.33E-01	2.61E-04	6.99E-02	0.00E+00	0.00E+00	6.99E-02	3.92E-05	1.43E-03	7.14E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-04	0.00E+00	1.02E-04	7.70E-01	<1	6.87E+00	<1
Chromium	1.13E+01	2.97E-03	6.93E-02	0.00E+00	0.00E+00	6.93E-02	4.47E-04	2.20E-02	9.17E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-04	0.00E+00	2.67E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	9.09E-03	2.33E+00	0.00E+00	0.00E+00	2.33E+00	1.37E-03	3.77E-01	2.71E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.42E+01	1.75E-03	1.77E-01	0.00E+00	0.00E+00	1.77E-01	2.63E-04	2.78E-02	2.05E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.83E+02	1.34E-01	5.73E+00	0.00E+00	0.00E+00	5.73E+00	2.02E-02	9.43E-01	6.69E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.19E-05	--	2.19E-05	1.41E+00	<1	1.41E+01	<1
Nickel	6.01E+01	3.96E-03	3.48E-01	0.00E+00	0.00E+00	3.48E-01	5.95E-04	1.17E-01	4.66E-01	1.70E+00	<1	1.48E+01	<1
Selenium	4.52E-01	7.23E-04	3.18E-02	0.00E+00	0.00E+00	3.18E-02	1.09E-04	8.83E-04	3.28E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.73E-01	2.54E-04	1.04E-04	0.00E+00	0.00E+00	1.04E-04	3.82E-05	3.38E-04	4.80E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	2.53E+01	2.33E-03	1.84E-02	0.00E+00	0.00E+00	1.84E-02	3.51E-04	4.94E-02	6.82E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.18E+01	2.54E-02	6.47E+00	0.00E+00	0.00E+00	6.47E+00	3.81E-03	1.01E-01	6.57E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.41E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	2.76E-03	8.89E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.18E+02	1.16E+00	1.07E+00	0.00E+00	0.00E+00	1.07E+00	1.74E-01	2.31E-01	1.47E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.03E-01	0.00E+00	1.37E-03	0.00E+00	0.00E+00	1.37E-03	0.00E+00	2.01E-04	1.58E-03	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.62E+00	0.00E+00	2.53E-04	0.00E+00	0.00E+00	2.53E-04	0.00E+00	5.11E-03	5.37E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.73E+00	4.12E-04	1.87E-01	0.00E+00	0.00E+00	1.87E-01	6.18E-05	9.23E-03	1.97E-01				
Fluoranthene	2.43E+01	1.76E-03	1.83E+00	0.00E+00	0.00E+00	1.83E+00	2.64E-04	4.75E-02	1.88E+00				
Fluorene	2.32E+00	0.00E+00	2.81E-04	0.00E+00	0.00E+00	2.81E-04	0.00E+00	4.52E-03	4.81E-03				
Naphthalene	8.57E-01	5.78E-04	1.57E+00	0.00E+00	0.00E+00	1.57E+00	8.69E-05	1.67E-03	1.57E+00				
Phenanthrene	2.22E+01	5.53E-04	8.71E-01	0.00E+00	0.00E+00	8.71E-01	8.31E-05	4.34E-02	9.15E-01				
Total LMW PAHs						4.46E+00	4.96E-04	1.11E-01	4.57E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.59E+00	5.75E-04	3.84E-02	0.00E+00	0.00E+00	3.84E-02	8.64E-05	1.87E-02	5.72E-02				
Benzo[A]Pyrene	8.52E+00	1.94E-03	1.54E-01	0.00E+00	0.00E+00	1.54E-01	2.91E-04	1.66E-02	1.71E-01				
Benzo(b)fluoranthene	1.18E+01	5.09E-03	5.48E-01	0.00E+00	0.00E+00	5.48E-01	7.65E-04	2.30E-02	5.71E-01				
Benzo(g,h,i)perylene	5.89E+00	7.31E-04	4.82E-01	0.00E+00	0.00E+00	4.82E-01	1.10E-04	1.15E-02	4.94E-01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	1.28E+01	3.69E-03	4.55E-02	0.00E+00	0.00E+00	4.55E-02	5.54E-04	2.50E-02	7.10E-02				
Dibenz(A,H)Anthracene	2.13E+00	6.70E-05	4.16E-02	0.00E+00	0.00E+00	4.16E-02	1.01E-05	4.16E-03	4.58E-02				
Indeno (1,2,3-CD) Pyrene	6.73E+00	3.28E-04	1.11E-01	0.00E+00	0.00E+00	1.11E-01	4.92E-05	1.32E-02	1.25E-01				
Pyrene	1.39E+01	1.33E-03	1.51E+00	0.00E+00	0.00E+00	1.51E+00	2.00E-04	2.72E-02	1.53E+00				
Total HMW PAHs						2.93E+00	2.09E-03	1.39E-01	3.07E+00	6.15E-01	4.99E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	7.86E-02	5.25E-03	2.81E-04	0.00E+00	0.00E+00	2.81E-04	7.89E-04	1.53E-04	1.22E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.36E+00	0.00E+00	3.83E-01	0.00E+00	0.00E+00	3.83E-01	0.00E+00	2.65E-03	3.86E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.43E-03	0.00E+00	1.03E-03	0.00E+00	0.00E+00	1.03E-03	0.00E+00	1.65E-05	1.05E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H15-9
Refined Exposure Evaluation - Meadow Vole
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	3.82E-09	0.00E+00	0.00E+00	3.82E-09	0.00E+00	5.27E-10	4.34E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	2.49E-09	0.00E+00	0.00E+00	2.49E-09	0.00E+00	6.25E-10	3.11E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	1.04E-08	0.00E+00	0.00E+00	1.04E-09	0.00E+00	4.80E-10	1.52E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	4.83E-09	0.00E+00	0.00E+00	4.83E-10	0.00E+00	2.23E-10	7.06E-10				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	1.78E-07	0.00E+00	0.00E+00	1.78E-09	0.00E+00	1.49E-09	3.27E-09				
OCDD	8.91E-04	0.00E+00	1.13E-06	0.00E+00	0.00E+00	3.39E-10	0.00E+00	5.22E-10	8.61E-10				
2,3,7,8-TCDF	1.78E-06	0.00E+00	4.53E-08	0.00E+00	0.00E+00	4.53E-09	0.00E+00	3.48E-10	4.88E-09				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	1.32E-08	0.00E+00	0.00E+00	3.95E-09	0.00E+00	5.57E-10	4.51E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	9.28E-09	0.00E+00	0.00E+00	9.28E-10	0.00E+00	3.26E-10	1.25E-09				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	4.33E-09	0.00E+00	0.00E+00	4.33E-10	0.00E+00	1.52E-10	5.86E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	4.35E-09	0.00E+00	0.00E+00	4.35E-10	0.00E+00	1.11E-10	5.46E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	2.23E-08	0.00E+00	0.00E+00	2.23E-10	0.00E+00	1.05E-10	3.28E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	3.84E-08	0.00E+00	0.00E+00	1.15E-11	0.00E+00	9.84E-12	2.14E-11				
Total Dioxins/Furans						2.05E-08	0.00E+00	5.48E-09	2.59E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-10
Refined Exposure Evaluation - North American Wolverine
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-05	0.00E+00	2.79E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.80E+00	9.37E-04	0.00E+00	0.00E+00	1.13E-03	1.13E-03	2.81E-05	5.72E-03	6.88E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.44E+02	1.73E-01	0.00E+00	0.00E+00	2.96E-03	2.96E-03	5.19E-03	1.21E-01	1.30E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	7.33E-01	2.61E-04	0.00E+00	0.00E+00	4.95E-05	4.95E-05	7.84E-06	6.16E-04	6.74E-04	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-05	0.00E+00	2.04E-05	7.70E-01	<1	6.87E+00	<1
Chromium	1.13E+01	2.97E-03	0.00E+00	0.00E+00	4.12E-02	4.12E-02	8.93E-05	9.47E-03	5.08E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-05	0.00E+00	5.34E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	9.09E-03	0.00E+00	0.00E+00	4.95E-01	4.95E-01	2.73E-04	1.62E-01	6.58E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.42E+01	1.75E-03	0.00E+00	0.00E+00	1.05E-01	1.05E-01	5.26E-05	1.20E-02	1.17E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.83E+02	1.34E-01	0.00E+00	0.00E+00	2.97E-01	2.97E-01	4.04E-03	4.06E-01	7.07E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.39E-06	--	4.39E-06	1.41E+00	<1	1.41E+01	<1
Nickel	6.01E+01	3.96E-03	0.00E+00	0.00E+00	1.58E-01	1.58E-01	1.19E-04	5.05E-02	2.09E-01	1.70E+00	<1	1.48E+01	<1
Selenium	4.52E-01	7.23E-04	0.00E+00	0.00E+00	1.47E-02	1.47E-02	2.17E-05	3.80E-04	1.51E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.73E-01	2.54E-04	0.00E+00	0.00E+00	5.63E-04	5.63E-04	7.63E-06	1.46E-04	7.16E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	2.53E+01	2.33E-03	0.00E+00	0.00E+00	9.35E-03	9.35E-03	7.02E-05	2.13E-02	3.07E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.18E+01	2.54E-02	0.00E+00	0.00E+00	3.12E+00	3.12E+00	7.62E-04	4.36E-02	3.16E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.41E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.19E-03	2.42E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.18E+02	1.16E+00	0.00E+00	0.00E+00	5.70E-02	5.70E-02	3.48E-02	9.97E-02	1.91E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.03E-01	0.00E+00	0.00E+00	0.00E+00	7.81E-04	7.81E-04	0.00E+00	8.65E-05	8.68E-04	6.80E-02	<1	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-03	2.20E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.73E+00	4.12E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-05	3.98E-03	3.99E-03				
Fluoranthene	2.43E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	2.05E-02	2.05E-02				
Fluorene	2.32E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-03	1.95E-03				
Naphthalene	8.57E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	7.21E-04	7.38E-04				
Phenanthrene	2.22E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-05	1.87E-02	1.87E-02				
Total LMW PAHs						0.00E+00	9.92E-05	4.80E-02	4.81E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.59E+00	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	8.07E-03	8.08E-03				
Benzo[A]Pyrene	8.52E+00	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-05	7.17E-03	7.23E-03				
Benzo(b)fluoranthene	1.18E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-04	9.89E-03	1.00E-02				
Benzo(g,h,i)perylene	5.89E+00	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-05	4.95E-03	4.98E-03				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	1.28E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-04	1.07E-02	1.09E-02				
Dibenz(A,H)Anthracene	2.13E+00	6.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-06	1.79E-03	1.79E-03				
Indeno (1,2,3-CD) Pyrene	6.73E+00	3.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-06	5.67E-03	5.68E-03				
Pyrene	1.39E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-05	1.17E-02	1.18E-02				
Total HMW PAHs						0.00E+00	4.18E-04	6.00E-02	6.04E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	7.86E-02	5.25E-03	0.00E+00	0.00E+00	1.84E-03	1.84E-03	1.58E-04	6.61E-05	2.06E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.36E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-03	2.29E-03	0.00E+00	1.14E-03	3.43E-03	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.43E-03	0.00E+00	0.00E+00	0.00E+00	1.14E-04	1.14E-04	0.00E+00	7.09E-06	1.21E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H15-10
Refined Exposure Evaluation - North American Wolverine
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	0.00E+00	4.07E-09	4.07E-09	0.00E+00	2.27E-10	4.29E-09				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	0.00E+00	4.90E-09	4.90E-09	0.00E+00	2.69E-10	5.17E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	0.00E+00	4.61E-08	4.61E-09	0.00E+00	2.07E-10	4.82E-09				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	0.00E+00	1.98E-08	1.98E-09	0.00E+00	9.59E-11	2.08E-09				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	0.00E+00	2.01E-06	2.01E-08	0.00E+00	6.42E-10	2.08E-08				
OCDD	8.91E-04	0.00E+00	0.00E+00	0.00E+00	3.00E-05	9.00E-09	0.00E+00	2.25E-10	9.22E-09				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	0.00E+00	6.69E-09	6.69E-10	0.00E+00	1.50E-10	8.19E-10				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	0.00E+00	3.57E-09	1.07E-09	0.00E+00	2.40E-10	1.31E-09				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	0.00E+00	6.28E-09	6.28E-10	0.00E+00	1.40E-10	7.68E-10				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	0.00E+00	2.93E-09	2.93E-10	0.00E+00	6.56E-11	3.59E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	0.00E+00	2.14E-09	2.14E-10	0.00E+00	4.80E-11	2.62E-10				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	0.00E+00	2.02E-08	2.02E-10	0.00E+00	4.52E-11	2.47E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	0.00E+00	6.31E-08	1.89E-11	0.00E+00	4.24E-12	2.32E-11				
Total Dioxins/Furans						4.78E-08	0.00E+00	2.36E-09	5.01E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H15-11
Refined Exposure Evaluation -Short-tailed Shrew
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04	0.00E+00	1.24E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	6.80E+00	9.37E-04	0.00E+00	1.25E-01	0.00E+00	1.25E-01	1.26E-04	1.00E-02	1.35E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.44E+02	1.73E-01	0.00E+00	1.76E+00	0.00E+00	1.76E+00	2.32E-02	2.13E-01	2.00E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	7.33E-01	2.61E-04	0.00E+00	4.42E-03	0.00E+00	4.42E-03	3.50E-05	1.08E-03	5.53E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.11E-05	0.00E+00	9.11E-05	7.70E-01	<1	6.87E+00	<1
Chromium	1.13E+01	2.97E-03	0.00E+00	4.62E-01	0.00E+00	4.62E-01	3.99E-04	1.66E-02	4.79E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-04	0.00E+00	2.38E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	9.09E-03	0.00E+00	1.33E+01	0.00E+00	1.33E+01	1.22E-03	2.84E-01	1.36E+01	5.60E+00	2.43E+00	8.27E+01	<1
Lead	1.42E+01	1.75E-03	0.00E+00	9.19E-01	0.00E+00	9.19E-01	2.35E-04	2.10E-02	9.40E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.83E+02	1.34E-01	0.00E+00	4.04E+00	0.00E+00	4.04E+00	1.80E-02	7.11E-01	4.77E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.96E-05	--	1.96E-05	1.41E+00	<1	1.41E+01	<1
Nickel	6.01E+01	3.96E-03	0.00E+00	6.26E+00	0.00E+00	6.26E+00	5.31E-04	8.86E-02	6.35E+00	1.70E+00	3.74E+00	1.48E+01	<1
Selenium	4.52E-01	7.23E-04	0.00E+00	6.95E-02	0.00E+00	6.95E-02	9.69E-05	6.67E-04	7.03E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.73E-01	2.54E-04	0.00E+00	1.25E-03	0.00E+00	1.25E-03	3.40E-05	2.55E-04	1.54E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	2.53E+01	2.33E-03	0.00E+00	1.42E-01	0.00E+00	1.42E-01	3.13E-04	3.73E-02	1.80E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.18E+01	2.54E-02	0.00E+00	4.18E+01	0.00E+00	4.18E+01	3.40E-03	7.64E-02	4.19E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.41E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	2.08E-03	7.55E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	1.18E+02	1.16E+00	0.00E+00	1.97E+00	0.00E+00	1.97E+00	1.55E-01	1.75E-01	2.30E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	1.03E-01	0.00E+00	0.00E+00	4.03E-01	0.00E+00	4.03E-01	0.00E+00	1.52E-04	4.03E-01	6.80E-02	5.93E+00	6.80E-01	<1
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.62E+00	0.00E+00	0.00E+00	5.16E-01	0.00E+00	5.16E-01	0.00E+00	3.86E-03	5.20E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.73E+00	4.12E-04	0.00E+00	1.53E+00	0.00E+00	1.53E+00	5.51E-05	6.97E-03	1.54E+00				
Fluoranthene	2.43E+01	1.76E-03	0.00E+00	9.91E+00	0.00E+00	9.91E+00	2.36E-04	3.59E-02	9.95E+00				
Fluorene	2.32E+00	0.00E+00	0.00E+00	2.97E+00	0.00E+00	2.97E+00	0.00E+00	3.41E-03	2.97E+00				
Naphthalene	8.57E-01	5.78E-04	0.00E+00	5.05E-01	0.00E+00	5.05E-01	7.75E-05	1.26E-03	5.06E-01				
Phenanthrene	2.22E+01	5.53E-04	0.00E+00	5.13E+00	0.00E+00	5.13E+00	7.41E-05	3.28E-02	5.16E+00				
Total LMW PAHs						2.06E+01	4.43E-04	8.42E-02	2.06E+01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	9.59E+00	5.75E-04	0.00E+00	2.04E+00	0.00E+00	2.04E+00	7.71E-05	1.41E-02	2.06E+00				
Benzo(A)Pyrene	8.52E+00	1.94E-03	0.00E+00	1.52E+00	0.00E+00	1.52E+00	2.60E-04	1.26E-02	1.53E+00				
Benzo(b)fluoranthene	1.18E+01	5.09E-03	0.00E+00	4.10E+00	0.00E+00	4.10E+00	6.82E-04	1.73E-02	4.11E+00				
Benzo(g,h,i)perylene	5.89E+00	7.31E-04	0.00E+00	2.32E+00	0.00E+00	2.32E+00	9.79E-05	8.68E-03	2.33E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	1.28E+01	3.69E-03	0.00E+00	3.92E+00	0.00E+00	3.92E+00	4.94E-04	1.88E-02	3.94E+00				
Dibenz(A,H)Anthracene	2.13E+00	6.70E-05	0.00E+00	6.60E-01	0.00E+00	6.60E-01	8.98E-06	3.14E-03	6.63E-01				
Indeno (1,2,3-CD) Pyrene	6.73E+00	3.28E-04	0.00E+00	2.58E+00	0.00E+00	2.58E+00	4.39E-05	9.93E-03	2.59E+00				
Pyrene	1.39E+01	1.33E-03	0.00E+00	3.27E+00	0.00E+00	3.27E+00	1.78E-04	2.05E-02	3.29E+00				
Total HMW PAHs						2.04E+01	1.86E-03	1.05E-01	2.05E+01	6.15E-01	3.34E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	7.86E-02	5.25E-03	0.00E+00	5.73E-01	0.00E+00	5.73E-01	7.04E-04	1.16E-04	5.74E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	1.36E+00	0.00E+00	0.00E+00	1.27E+00	0.00E+00	1.27E+00	0.00E+00	2.00E-03	1.27E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	8.43E-03	0.00E+00	0.00E+00	1.16E-02	0.00E+00	1.16E-02	0.00E+00	1.24E-05	1.17E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H15-11
Refined Exposure Evaluation -Short-tailed Shrew
Central Landfills Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	2.70E-07	0.00E+00	0.00E+00	7.90E-08	0.00E+00	7.90E-08	0.00E+00	3.98E-10	7.94E-08				
1,2,3,7,8-PeCDD	3.20E-07	0.00E+00	0.00E+00	9.65E-08	0.00E+00	9.65E-08	0.00E+00	4.72E-10	9.70E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.46E-06	0.00E+00	0.00E+00	1.08E-06	0.00E+00	1.08E-07	0.00E+00	3.63E-10	1.08E-07				
1,2,3,7,8,9-HxCDD	1.14E-06	0.00E+00	0.00E+00	4.33E-07	0.00E+00	4.33E-08	0.00E+00	1.68E-10	4.35E-08				
1,2,3,4,6,7,8-HpCDD	7.63E-05	0.00E+00	0.00E+00	6.23E-05	0.00E+00	6.23E-07	0.00E+00	1.12E-09	6.24E-07				
OCDD	8.91E-04	0.00E+00	0.00E+00	1.14E-03	0.00E+00	3.41E-07	0.00E+00	3.94E-10	3.42E-07				
2,3,7,8-TCDF	1.78E-06	0.00E+00	0.00E+00	7.34E-07	0.00E+00	7.34E-08	0.00E+00	2.62E-10	7.36E-08				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	9.50E-07	0.00E+00	0.00E+00	3.49E-07	0.00E+00	1.05E-07	0.00E+00	4.20E-10	1.05E-07				
1,2,3,4,7,8-HxCDF	1.67E-06	0.00E+00	0.00E+00	6.80E-07	0.00E+00	6.80E-08	0.00E+00	2.46E-10	6.83E-08				
1,2,3,6,7,8-HxCDF	7.80E-07	0.00E+00	0.00E+00	2.77E-07	0.00E+00	2.77E-08	0.00E+00	1.15E-10	2.78E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	5.70E-07	0.00E+00	0.00E+00	1.91E-07	0.00E+00	1.91E-08	0.00E+00	8.40E-11	1.92E-08				
1,2,3,4,6,7,8-HpCDF	5.37E-06	0.00E+00	0.00E+00	2.71E-06	0.00E+00	2.71E-08	0.00E+00	7.92E-11	2.71E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.68E-05	0.00E+00	0.00E+00	1.04E-05	0.00E+00	3.13E-09	0.00E+00	7.43E-12	3.13E-09				
Total Dioxins/Furans						1.61E-06	0.00E+00	4.13E-09	1.62E-06	5.62E-07	2.88E+00	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	2.80E+00	Regression ^a	1.04E-01	USEPA (2007)	1.00E+00	2.80E+00	Assumption ^c	5.00E-02	1.40E-01	Baes et al. (1984) ^e
Arsenic	NA	2.18E+01	3.75E-02	8.17E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.12E+00	Sample et al. (1999)	Regression ^f	9.78E-02	Sample et al. (1998b)
Barium	NA	2.21E+02	1.56E-01	3.45E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.02E+01	Sample et al. (1998a)	6.83E-04	1.51E-01	Baes et al. (1984) ^e
Beryllium	NA	6.49E+00	Regression ^a	2.31E+00	USEPA (2007)	4.50E-02	2.92E-01	Sample et al. (1998a)	2.25E-03	1.46E-02	Baes et al. (1984) ^e
Cadmium	NA	9.40E-01	Regression ^a	6.01E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.88E+00	Sample et al. (1999)	Regression ^f	2.76E-01	Sample et al. (1998b)
Chromium	NA	3.58E+01	4.10E-02	1.47E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	1.09E+01	Sample et al. (1998a)	Regression ^f	3.21E+00	Sample et al. (1998b)
Cobalt	NA	1.09E+01	7.50E-03	8.20E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.33E+00	Sample et al. (1998a)	Regression ^f	2.62E-01	Sample et al. (1998b)
Copper	NA	5.06E+01	Regression ^a	9.15E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.61E+01	Sample et al. (1998a)	Regression ^f	1.36E+01	Sample et al. (1998b)
Lead	NA	1.67E+01	Regression ^a	1.29E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.81E+00	Sample et al. (1999)	Regression ^f	3.75E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	4.18E+02	Regression ^a	9.89E+00	Bechtel-Jacobs (1998a)	7.78E-01	3.25E+02	Sample et al. (1998a)	Regression ^f	1.30E+01	Sample et al. (1998b)
Selenium	NA	7.50E-01	Regression ^a	3.70E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.51E-01	Sample et al. (1998a)	Regression ^f	5.92E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	1.70E-01	4.00E-03	6.80E-04	Baes et al. (1984)	5.41E-02	9.20E-03	USCHPPM (2004)	1.08E-01	1.84E-02	Baes et al. (1984) ^e
Vanadium	NA	1.53E+02	4.85E-03	7.43E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.43E+00	Sample et al. (1998a)	1.23E-02	1.88E+00	Sample et al. (1998b) ⁱ
Zinc	NA	6.50E+01	Regression ^a	4.88E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.36E+02	Sample et al. (1998a)	Regression ^f	1.05E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.90E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	3.58E+02	6.00E-02	2.15E+01	Baes et al. (1984)	1.24E-01	4.43E+01	USCHPPM (2004)	1.60E-02	5.72E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	2.77E+00	Regression ^a	1.61E-03	USEPA (2007a)	1.47E+00	4.07E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	6.73E+01	5.00E-01	3.37E+01	USEPA (2007a)	3.04E+00	2.05E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	1.64E+00	1.22E+01	2.00E+01	USEPA (2007a)	4.40E+00	7.22E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	3.65E+01	Regression ^a	7.88E+00	USEPA (2007a)	1.72E+00	6.27E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs											

Table H16-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	4.17E+01	Regression ^a	6.13E-01	USEPA (2007a)	1.59E+00	6.64E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	5.13E+01	Regression ^a	5.92E+00	USEPA (2007a)	1.33E+00	6.83E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.74E+01	3.10E-01	1.78E+01	USEPA (2007a)	2.60E+00	1.49E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	4.28E+01	Regression ^a	3.35E+01	USEPA (2007a)	2.94E+00	1.26E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	4.90E+01	Regression ^a	6.74E-01	USEPA (2007a)	2.29E+00	1.12E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	6.36E+01	7.20E-01	4.58E+01	USEPA (2007a)	1.75E+00	1.11E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H16-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H16-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H16-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	2.88E+00	Regression ^a	1.06E-01	USEPA (2007)	1.00E+00	2.88E+00	Assumption ^c	5.00E-02	1.44E-01	Baes et al. (1984) ^e
Arsenic	NA	2.14E+01	3.75E-02	8.05E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.10E+00	Sample et al. (1999)	Regression ^f	9.66E-02	Sample et al. (1998b)
Barium	NA	1.83E+02	1.56E-01	2.86E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.67E+01	Sample et al. (1998a)	6.83E-04	1.25E-01	Baes et al. (1984) ^e
Beryllium	NA	6.93E+00	Regression ^a	2.42E+00	USEPA (2007)	4.50E-02	3.12E-01	Sample et al. (1998a)	2.25E-03	1.56E-02	Baes et al. (1984) ^e
Cadmium	NA	1.17E+00	Regression ^a	6.77E-01	Bechtel-Jacobs (1998a)	Regression ^d	9.37E+00	Sample et al. (1999)	Regression ^f	3.06E-01	Sample et al. (1998b)
Chromium	NA	2.27E+01	4.10E-02	9.29E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	6.93E+00	Sample et al. (1998a)	Regression ^f	2.29E+00	Sample et al. (1998b)
Cobalt	NA	1.09E+01	7.50E-03	8.17E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.33E+00	Sample et al. (1998a)	Regression ^f	2.60E-01	Sample et al. (1998b)
Copper	NA	5.34E+02	Regression ^a	2.32E+01	Bechtel-Jacobs (1998a)	5.15E-01	2.75E+02	Sample et al. (1998a)	Regression ^f	1.91E+01	Sample et al. (1998b)
Lead	NA	1.58E+01	Regression ^a	1.25E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.48E+00	Sample et al. (1999)	Regression ^f	3.66E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	4.52E+02	Regression ^a	1.05E+01	Bechtel-Jacobs (1998a)	7.78E-01	3.52E+02	Sample et al. (1998a)	Regression ^f	1.35E+01	Sample et al. (1998b)
Selenium	NA	4.80E-01	Regression ^a	2.26E-01	Bechtel-Jacobs (1998a)	Regression ^d	5.42E-01	Sample et al. (1998a)	Regression ^f	5.01E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	1.85E-01	4.00E-03	7.40E-04	Baes et al. (1984)	5.41E-02	1.00E-02	USCHPPM (2004)	1.08E-01	2.00E-02	Baes et al. (1984) ^e
Vanadium	NA	1.51E+02	4.85E-03	7.30E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.32E+00	Sample et al. (1998a)	1.23E-02	1.85E+00	Sample et al. (1998b) ⁱ
Zinc	NA	5.65E+01	Regression ^a	4.51E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.21E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.73E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	5.13E+02	6.00E-02	3.08E+01	Baes et al. (1984)	1.24E-01	6.36E+01	USCHPPM (2004)	1.60E-02	8.21E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	1.06E+00	Regression ^a	3.66E-03	USEPA (2007a)	1.47E+00	1.55E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.64E+01	5.00E-01	8.19E+00	USEPA (2007a)	3.04E+00	4.98E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.04E-01	1.22E+01	6.15E+00	USEPA (2007a)	4.40E+00	2.22E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	7.86E+00	Regression ^a	3.04E+00	USEPA (2007a)	1.72E+00	1.35E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs											

Table H16-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	1.11E+01	Regression ^a	2.79E-01	USEPA (2007a)	1.59E+00	1.76E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.40E+01	Regression ^a	1.66E+00	USEPA (2007a)	1.33E+00	1.86E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.55E+01	3.10E-01	4.80E+00	USEPA (2007a)	2.60E+00	4.03E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	1.36E+01	Regression ^a	8.67E+00	USEPA (2007a)	2.94E+00	4.01E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	1.28E+01	Regression ^a	3.03E-01	USEPA (2007a)	2.29E+00	2.92E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.61E+01	7.20E-01	1.16E+01	USEPA (2007a)	1.75E+00	2.83E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H16-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H16-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Industrial Landfills Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H16-2
Refined Exposure Evaluation - American Woodcock
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	9.28E-04	1.22E-03	2.96E-01	0.00E+00	2.97E-01	1.09E-04	2.47E-02	3.22E-01	No TRV	--	No TRV	--
Arsenic	2.18E+01	9.37E-04	9.59E-03	2.25E-01	0.00E+00	2.34E-01	1.10E-04	1.92E-01	4.26E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.21E+02	1.73E-01	4.06E-01	2.13E+00	0.00E+00	2.54E+00	2.03E-02	1.95E+00	4.51E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	6.49E+00	2.61E-04	2.72E-02	3.09E-02	0.00E+00	5.81E-02	3.07E-05	5.72E-02	1.15E-01	No TRV	--	No TRV	--
Cadmium	9.40E-01	6.80E-04	7.06E-03	8.34E-01	0.00E+00	8.41E-01	7.99E-05	8.28E-03	8.49E-01	1.47E+00	<1	6.35E+00	<1
Chromium	3.58E+01	2.97E-03	1.72E-02	1.16E+00	0.00E+00	1.17E+00	3.49E-04	3.15E-01	1.49E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	1.09E+01	1.78E-03	9.64E-04	1.41E-01	0.00E+00	1.42E-01	2.09E-04	9.64E-02	2.39E-01	7.61E+00	<1	2.02E+01	<1
Copper	5.06E+01	9.09E-03	1.08E-01	2.76E+00	0.00E+00	2.86E+00	1.07E-03	4.46E-01	3.31E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.67E+01	1.75E-03	1.51E-02	8.25E-01	0.00E+00	8.40E-01	2.06E-04	1.47E-01	9.88E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-02	0.00E+00	1.58E-02	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.72E-05	--	1.72E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.18E+02	3.96E-03	1.16E-01	3.44E+01	0.00E+00	3.45E+01	4.65E-04	3.68E+00	3.82E+01	6.71E+00	5.69E+00	1.86E+01	2.05E+00
Selenium	7.50E-01	7.23E-04	4.35E-03	7.94E-02	0.00E+00	8.38E-02	8.49E-05	6.61E-03	9.05E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	2.54E-04	7.99E-06	9.72E-04	0.00E+00	9.80E-04	2.98E-05	1.50E-03	2.51E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.53E+02	2.33E-03	8.73E-03	6.80E-01	0.00E+00	6.89E-01	2.74E-04	1.35E+00	2.04E+00	3.44E-01	5.93E+00	1.70E+00	1.20E+00
Zinc	6.50E+01	2.54E-02	5.73E-01	3.56E+01	0.00E+00	3.61E+01	2.98E-03	5.72E-01	3.67E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	1.67E-03	6.47E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	3.58E+02	1.16E+00	2.52E-01	4.69E+00	0.00E+00	4.94E+00	1.36E-01	3.15E+00	8.23E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.77E+00	0.00E+00	1.89E-05	4.30E-01	0.00E+00	4.30E-01	0.00E+00	2.44E-02	4.54E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.83E-05	--	4.83E-05				
Fluoranthene	6.73E+01	1.76E-03	3.95E-01	2.16E+01	0.00E+00	2.20E+01	2.07E-04	5.93E-01	2.26E+01				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	1.64E+00	5.78E-04	2.35E-01	7.63E-01	0.00E+00	9.98E-01	6.79E-05	1.44E-02	1.01E+00				
Phenanthrene	3.65E+01	5.53E-04	9.26E-02	6.63E+00	0.00E+00	6.73E+00	6.50E-05	3.21E-01	7.05E+00				
Total LMW PAHs						3.02E+01	3.88E-04	9.53E-01	3.11E+01	1.61E+01	1.93E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.17E+01	5.75E-04	7.20E-03	7.02E+00	0.00E+00	7.03E+00	6.76E-05	3.68E-01	7.39E+00				
Benzo(A)Pyrene	5.13E+01	1.94E-03	6.95E-02	7.22E+00	0.00E+00	7.29E+00	2.28E-04	4.52E-01	7.74E+00				
Benzo(b)fluoranthene	5.74E+01	5.09E-03	2.09E-01	1.58E+01	0.00E+00	1.60E+01	5.98E-04	5.06E-01	1.65E+01				
Benzo(g,h,i)perylene	4.28E+01	7.31E-04	3.94E-01	1.33E+01	0.00E+00	1.37E+01	8.58E-05	3.77E-01	1.41E+01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	4.90E+01	3.69E-03	7.92E-03	1.19E+01	0.00E+00	1.19E+01	4.33E-04	4.32E-01	1.23E+01				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.87E-06	--	7.87E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.85E-05	--	3.85E-05				
Pyrene	6.36E+01	1.33E-03	5.38E-01	1.18E+01	0.00E+00	1.23E+01	1.56E-04	5.61E-01	1.29E+01				
Total HMW PAHs						6.82E+01	1.63E-03	2.70E+00	7.09E+01	2.00E+00	3.54E+01	2.00E+01	3.54E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	6.17E-04	--	6.17E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	ND	--	--	--	0.00E+00	--	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H16-2
Refined Exposure Evaluation - American Woodcock
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-3
Refined Exposure Evaluation - Mourning Dove
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	9.28E-04	1.18E-02	0.00E+00	0.00E+00	1.18E-02	1.06E-04	2.17E-02	3.37E-02	No TRV	--	No TRV	--
Arsenic	2.18E+01	9.37E-04	9.32E-02	0.00E+00	0.00E+00	9.32E-02	1.07E-04	1.69E-01	2.62E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.21E+02	1.73E-01	3.94E+00	0.00E+00	0.00E+00	3.94E+00	1.97E-02	1.72E+00	5.68E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	6.49E+00	2.61E-04	2.64E-01	0.00E+00	0.00E+00	2.64E-01	2.98E-05	5.04E-02	3.14E-01	No TRV	--	No TRV	--
Cadmium	9.40E-01	6.80E-04	6.86E-02	0.00E+00	0.00E+00	6.86E-02	7.76E-05	7.30E-03	7.60E-02	1.47E+00	<1	6.35E+00	<1
Chromium	3.58E+01	2.97E-03	1.67E-01	0.00E+00	0.00E+00	1.67E-01	3.39E-04	2.78E-01	4.45E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	1.09E+01	1.78E-03	9.36E-03	0.00E+00	0.00E+00	9.36E-03	2.03E-04	8.49E-02	9.45E-02	7.61E+00	<1	2.02E+01	<1
Copper	5.06E+01	9.09E-03	1.04E+00	0.00E+00	0.00E+00	1.04E+00	1.04E-03	3.93E-01	1.44E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.67E+01	1.75E-03	1.47E-01	0.00E+00	0.00E+00	1.47E-01	2.00E-04	1.30E-01	2.77E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-02	0.00E+00	1.53E-02	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.67E-05	--	1.67E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.18E+02	3.96E-03	1.13E+00	0.00E+00	0.00E+00	1.13E+00	4.52E-04	3.24E+00	4.37E+00	6.71E+00	<1	1.86E+01	<1
Selenium	7.50E-01	7.23E-04	4.22E-02	0.00E+00	0.00E+00	4.22E-02	8.25E-05	5.82E-03	4.81E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	2.54E-04	7.76E-05	0.00E+00	0.00E+00	7.76E-05	2.90E-05	1.32E-03	1.43E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.53E+02	2.33E-03	8.48E-02	0.00E+00	0.00E+00	8.48E-02	2.66E-04	1.19E+00	1.27E+00	3.44E-01	3.70E+00	1.70E+00	<1
Zinc	6.50E+01	2.54E-02	5.57E+00	0.00E+00	0.00E+00	5.57E+00	2.89E-03	5.04E-01	6.07E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	1.47E-03	6.13E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	3.58E+02	1.16E+00	2.45E+00	0.00E+00	0.00E+00	2.45E+00	1.32E-01	2.78E+00	5.36E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.77E+00	0.00E+00	1.84E-04	0.00E+00	0.00E+00	1.84E-04	0.00E+00	2.15E-02	2.17E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.70E-05	--	4.70E-05				
Fluoranthene	6.73E+01	1.76E-03	3.84E+00	0.00E+00	0.00E+00	3.84E+00	2.01E-04	5.22E-01	4.36E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	1.64E+00	5.78E-04	2.28E+00	0.00E+00	0.00E+00	2.28E+00	6.60E-05	1.27E-02	2.30E+00				
Phenanthrene	3.65E+01	5.53E-04	9.00E-01	0.00E+00	0.00E+00	9.00E-01	6.31E-05	2.83E-01	1.18E+00				
Total LMW PAHs						7.02E+00	3.77E-04	8.40E-01	7.86E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.17E+01	5.75E-04	6.99E-02	0.00E+00	0.00E+00	6.99E-02	6.56E-05	3.24E-01	3.94E-01				
Benzo[A]Pyrene	5.13E+01	1.94E-03	6.76E-01	0.00E+00	0.00E+00	6.76E-01	2.21E-04	3.98E-01	1.07E+00				
Benzo(b)fluoranthene	5.74E+01	5.09E-03	2.03E+00	0.00E+00	0.00E+00	2.03E+00	5.81E-04	4.46E-01	2.48E+00				
Benzo(g,h,i)perylene	4.28E+01	7.31E-04	3.82E+00	0.00E+00	0.00E+00	3.82E+00	8.34E-05	3.32E-01	4.16E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	4.90E+01	3.69E-03	7.69E-02	0.00E+00	0.00E+00	7.69E-02	4.21E-04	3.80E-01	4.58E-01				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.65E-06	--	7.65E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.74E-05	--	3.74E-05				
Pyrene	6.36E+01	1.33E-03	5.23E+00	0.00E+00	0.00E+00	5.23E+00	1.52E-04	4.94E-01	5.72E+00				
Total HMW PAHs						1.19E+01	1.59E-03	2.37E+00	1.43E+01	2.00E+00	7.14E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	5.99E-04	--	5.99E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H16-3
Refined Exposure Evaluation - Mourning Dove
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-4
Refined Exposure Evaluation - Red-tailed Hawk
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	9.28E-04	0.00E+00	0.00E+00	1.15E-02	1.15E-02	7.61E-05	5.97E-03	1.75E-02	No TRV	--	No TRV	--
Arsenic	2.18E+01	9.37E-04	0.00E+00	0.00E+00	8.02E-03	8.02E-03	7.68E-05	4.64E-02	5.45E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.21E+02	1.73E-01	0.00E+00	0.00E+00	1.24E-02	1.24E-02	1.42E-02	4.72E-01	4.99E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	6.49E+00	2.61E-04	0.00E+00	0.00E+00	1.20E-03	1.20E-03	2.14E-05	1.38E-02	1.51E-02	No TRV	--	No TRV	--
Cadmium	9.40E-01	6.80E-04	0.00E+00	0.00E+00	2.27E-02	2.27E-02	5.58E-05	2.00E-03	2.47E-02	1.47E+00	<1	6.35E+00	<1
Chromium	3.58E+01	2.97E-03	0.00E+00	0.00E+00	2.63E-01	2.63E-01	2.44E-04	7.62E-02	3.39E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	1.09E+01	1.78E-03	0.00E+00	0.00E+00	2.15E-02	2.15E-02	1.46E-04	2.33E-02	4.49E-02	7.61E+00	<1	2.02E+01	<1
Copper	5.06E+01	9.09E-03	0.00E+00	0.00E+00	1.11E+00	1.11E+00	7.45E-04	1.08E-01	1.22E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.67E+01	1.75E-03	0.00E+00	0.00E+00	3.07E-01	3.07E-01	1.44E-04	3.56E-02	3.43E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-02	0.00E+00	1.10E-02	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.20E-05	--	1.20E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.18E+02	3.96E-03	0.00E+00	0.00E+00	1.07E+00	1.07E+00	3.25E-04	8.91E-01	1.96E+00	6.71E+00	<1	1.86E+01	<1
Selenium	7.50E-01	7.23E-04	0.00E+00	0.00E+00	4.86E-02	4.86E-02	5.93E-05	1.60E-03	5.02E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	2.54E-04	0.00E+00	0.00E+00	1.51E-03	1.51E-03	2.08E-05	3.62E-04	1.89E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.53E+02	2.33E-03	0.00E+00	0.00E+00	1.55E-01	1.55E-01	1.91E-04	3.27E-01	4.81E-01	3.44E-01	1.40E+00	1.70E+00	<1
Zinc	6.50E+01	2.54E-02	0.00E+00	0.00E+00	8.64E+00	8.64E+00	2.08E-03	1.38E-01	8.79E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	4.05E-04	3.75E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	3.58E+02	1.16E+00	0.00E+00	0.00E+00	4.69E-01	4.69E-01	9.49E-02	7.62E-01	1.33E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-03	5.90E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	3.37E-05	--	3.37E-05				
Fluoranthene	6.73E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-04	1.44E-01	1.44E-01				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	1.64E+00	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E-05	3.50E-03	3.54E-03				
Phenanthrene	3.65E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-05	7.78E-02	7.78E-02				
Total LMW PAHs						0.00E+00	2.71E-04	2.31E-01	2.31E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.17E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-05	8.90E-02	8.91E-02				
Benzo(A)Pyrene	5.13E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	1.09E-01	1.10E-01				
Benzo(b)fluoranthene	5.74E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-04	1.22E-01	1.23E-01				
Benzo(g,h,i)perylene	4.28E+01	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.99E-05	9.12E-02	9.13E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	4.90E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.02E-04	1.05E-01	1.05E-01				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	5.49E-06	--	5.49E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	2.69E-05	--	2.69E-05				
Pyrene	6.36E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	1.36E-01	1.36E-01				
Total HMW PAHs						0.00E+00	1.14E-03	6.52E-01	6.53E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	4.31E-04	--	4.31E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H16-4
Refined Exposure Evaluation - Red-tailed Hawk
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	2.80E+00	9.28E-04	0.00E+00	4.43E-01	0.00E+00	4.43E-01	1.47E-04	0.00E+00	4.43E-01	No TRV	--	No TRV	--
Arsenic	2.18E+01	9.37E-04	0.00E+00	3.36E-01	0.00E+00	3.36E-01	1.48E-04	0.00E+00	3.37E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.21E+02	1.73E-01	0.00E+00	3.19E+00	0.00E+00	3.19E+00	2.74E-02	0.00E+00	3.22E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	6.49E+00	2.61E-04	0.00E+00	4.63E-02	0.00E+00	4.63E-02	4.13E-05	0.00E+00	4.63E-02	No TRV	--	No TRV	--
Cadmium	9.40E-01	6.80E-04	0.00E+00	1.25E+00	0.00E+00	1.25E+00	1.08E-04	0.00E+00	1.25E+00	1.47E+00	<1	6.35E+00	<1
Chromium	3.58E+01	2.97E-03	0.00E+00	1.73E+00	0.00E+00	1.73E+00	4.71E-04	0.00E+00	1.73E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	1.09E+01	1.78E-03	0.00E+00	2.11E-01	0.00E+00	2.11E-01	2.82E-04	0.00E+00	2.12E-01	7.61E+00	<1	2.02E+01	<1
Copper	5.06E+01	9.09E-03	0.00E+00	4.13E+00	0.00E+00	4.13E+00	1.44E-03	0.00E+00	4.13E+00	4.05E+00	1.02E+00	3.48E+01	<1
Lead	1.67E+01	1.75E-03	0.00E+00	1.24E+00	0.00E+00	1.24E+00	2.77E-04	0.00E+00	1.24E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-02	0.00E+00	2.13E-02	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.31E-05	--	2.31E-05	4.50E-01	<1	9.10E-01	<1
Nickel	4.18E+02	3.96E-03	0.00E+00	5.15E+01	0.00E+00	5.15E+01	6.27E-04	0.00E+00	5.15E+01	6.71E+00	7.67E+00	1.86E+01	2.77E+00
Selenium	7.50E-01	7.23E-04	0.00E+00	1.19E-01	0.00E+00	1.19E-01	1.14E-04	0.00E+00	1.19E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.70E-01	2.54E-04	0.00E+00	1.46E-03	0.00E+00	1.46E-03	4.02E-05	0.00E+00	1.50E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.53E+02	2.33E-03	0.00E+00	1.02E+00	0.00E+00	1.02E+00	3.70E-04	0.00E+00	1.02E+00	3.44E-01	2.96E+00	1.70E+00	<1
Zinc	6.50E+01	2.54E-02	0.00E+00	5.32E+01	0.00E+00	5.32E+01	4.01E-03	0.00E+00	5.32E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	3.58E+02	1.16E+00	0.00E+00	7.02E+00	0.00E+00	7.02E+00	1.83E-01	0.00E+00	7.20E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.77E+00	0.00E+00	0.00E+00	6.44E-01	0.00E+00	6.44E-01	0.00E+00	0.00E+00	6.44E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.52E-05	--	6.52E-05				
Fluoranthene	6.73E+01	1.76E-03	0.00E+00	3.24E+01	0.00E+00	3.24E+01	2.79E-04	0.00E+00	3.24E+01				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	1.64E+00	5.78E-04	0.00E+00	1.14E+00	0.00E+00	1.14E+00	9.15E-05	0.00E+00	1.14E+00				
Phenanthrene	3.65E+01	5.53E-04	0.00E+00	9.93E+00	0.00E+00	9.93E+00	8.76E-05	0.00E+00	9.93E+00				
Total LMW PAHs						4.41E+01	5.23E-04	0.00E+00	4.41E+01	1.61E+01	2.74E+00	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.17E+01	5.75E-04	0.00E+00	1.05E+01	0.00E+00	1.05E+01	9.11E-05	0.00E+00	1.05E+01				
Benzo(A)Pyrene	5.13E+01	1.94E-03	0.00E+00	1.08E+01	0.00E+00	1.08E+01	3.07E-04	0.00E+00	1.08E+01				
Benzo(b)fluoranthene	5.74E+01	5.09E-03	0.00E+00	2.36E+01	0.00E+00	2.36E+01	8.06E-04	0.00E+00	2.37E+01				
Benzo(g,h,i)perylene	4.28E+01	7.31E-04	0.00E+00	1.99E+01	0.00E+00	1.99E+01	1.16E-04	0.00E+00	1.99E+01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	4.90E+01	3.69E-03	0.00E+00	1.78E+01	0.00E+00	1.78E+01	5.84E-04	0.00E+00	1.78E+01				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.06E-05	--	1.06E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	5.19E-05	--	5.19E-05				
Pyrene	6.36E+01	1.33E-03	0.00E+00	1.76E+01	0.00E+00	1.76E+01	2.11E-04	0.00E+00	1.76E+01				
Total HMW PAHs						1.00E+02	2.20E-03	0.00E+00	1.00E+02	2.00E+00	5.01E+01	2.00E+01	5.01E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	8.31E-04	--	8.31E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H16-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-6
Refined Exposure Evaluation - Canada Lynx
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	2.80E+00	9.28E-04	0.00E+00	0.00E+00	4.37E-03	4.37E-03	2.90E-05	2.45E-03	6.85E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.18E+01	9.37E-04	0.00E+00	0.00E+00	3.06E-03	3.06E-03	2.93E-05	1.90E-02	2.21E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.21E+02	1.73E-01	0.00E+00	0.00E+00	4.72E-03	4.72E-03	5.40E-03	1.94E-01	2.04E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.49E+00	2.61E-04	0.00E+00	0.00E+00	4.56E-04	4.56E-04	8.15E-06	5.68E-03	6.15E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	9.40E-01	6.80E-04	0.00E+00	0.00E+00	8.63E-03	8.63E-03	2.12E-05	8.22E-04	9.48E-03	7.70E-01	<1	6.87E+00	<1
Chromium	3.58E+01	2.97E-03	0.00E+00	0.00E+00	1.00E-01	1.00E-01	9.29E-05	3.13E-02	1.32E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.09E+01	1.78E-03	0.00E+00	0.00E+00	8.18E-03	8.18E-03	5.56E-05	9.57E-03	1.78E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.06E+01	9.09E-03	0.00E+00	0.00E+00	4.24E-01	4.24E-01	2.84E-04	4.43E-02	4.69E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.67E+01	1.75E-03	0.00E+00	0.00E+00	1.17E-01	1.17E-01	5.47E-05	1.46E-02	1.32E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-03	0.00E+00	4.20E-03	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.56E-06	--	4.56E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.18E+02	3.96E-03	0.00E+00	0.00E+00	4.06E-01	4.06E-01	1.24E-04	3.66E-01	7.72E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.50E-01	7.23E-04	0.00E+00	0.00E+00	1.85E-02	1.85E-02	2.26E-05	6.56E-04	1.92E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.70E-01	2.54E-04	0.00E+00	0.00E+00	5.75E-04	5.75E-04	7.94E-06	1.49E-04	7.31E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.53E+02	2.33E-03	0.00E+00	0.00E+00	5.89E-02	5.89E-02	7.29E-05	1.34E-01	1.93E-01	4.16E+00	<1	9.44E+00	<1
Zinc	6.50E+01	2.54E-02	0.00E+00	0.00E+00	3.29E+00	3.29E+00	7.92E-04	5.68E-02	3.35E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.90E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	1.66E-04	1.44E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	3.58E+02	1.16E+00	0.00E+00	0.00E+00	1.79E-01	1.79E-01	3.62E-02	3.13E-01	5.28E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.77E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-03	2.42E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.29E-05	--	1.29E-05				
Fluoranthene	6.73E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-05	5.89E-02	5.89E-02				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	1.64E+00	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-05	1.43E-03	1.45E-03				
Phenanthrene	3.65E+01	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	3.19E-02	3.19E-02				
Total LMW PAHs						0.00E+00	1.03E-04	9.46E-02	9.47E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.17E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05	3.65E-02	3.65E-02				
Benzo[A]Pyrene	5.13E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-05	4.49E-02	4.50E-02				
Benzo(b)fluoranthene	5.74E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	5.03E-02	5.04E-02				
Benzo(g,h,i)perylene	4.28E+01	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-05	3.74E-02	3.75E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	4.90E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-04	4.29E-02	4.30E-02				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.09E-06	--	2.09E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.02E-05	--	1.02E-05				
Pyrene	6.36E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-05	5.57E-02	5.57E-02				
Total HMW PAHs						0.00E+00	4.34E-04	2.68E-01	2.68E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	1.64E-04	--	1.64E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H16-6
Refined Exposure Evaluation - Canada Lynx
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-7
Refined Exposure Evaluation - Grizzly Bear
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	2.80E+00	9.28E-04	1.45E-03	9.07E-03	3.02E-04	0.00E+00	1.08E-02	2.00E-05	1.69E-03	1.25E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.18E+01	9.37E-04	1.15E-02	6.88E-03	2.11E-04	0.00E+00	1.86E-02	2.02E-05	1.32E-02	3.17E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.21E+02	1.73E-01	4.85E-01	6.53E-02	3.26E-04	0.00E+00	5.50E-01	3.73E-03	1.34E-01	6.88E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.49E+00	2.61E-04	3.24E-02	9.47E-04	3.16E-05	0.00E+00	3.34E-02	5.64E-06	3.93E-03	3.74E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	9.40E-01	6.80E-04	8.44E-03	2.55E-02	5.97E-04	0.00E+00	3.46E-02	1.47E-05	5.68E-04	3.52E-02	7.70E-01	<1	6.87E+00	<1
Chromium	3.58E+01	2.97E-03	2.06E-02	3.54E-02	6.92E-03	0.00E+00	6.29E-02	6.42E-05	2.16E-02	8.46E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	1.09E+01	1.78E-03	1.15E-03	4.32E-03	5.65E-04	0.00E+00	6.04E-03	3.84E-05	6.61E-03	1.27E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.06E+01	9.09E-03	1.28E-01	8.44E-02	2.93E-02	0.00E+00	2.42E-01	1.96E-04	3.06E-02	2.73E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.67E+01	1.75E-03	1.81E-02	2.53E-02	8.10E-03	0.00E+00	5.14E-02	3.78E-05	1.01E-02	6.16E-02	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-03	0.00E+00	2.90E-03	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	0.00E+00	3.15E-06	--	3.15E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.18E+02	3.96E-03	1.39E-01	1.05E+00	2.81E-02	0.00E+00	1.22E+00	8.55E-05	2.53E-01	1.47E+00	1.70E+00	<1	1.48E+01	<1
Selenium	7.50E-01	7.23E-04	5.19E-03	2.43E-03	1.28E-03	0.00E+00	8.90E-03	1.56E-05	4.54E-04	9.37E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.70E-01	2.54E-04	9.55E-06	2.98E-05	3.97E-05	0.00E+00	7.91E-05	5.49E-06	1.03E-04	1.87E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.53E+02	2.33E-03	1.04E-02	2.08E-02	4.07E-03	0.00E+00	3.53E-02	5.04E-05	9.26E-02	1.28E-01	4.16E+00	<1	9.44E+00	<1
Zinc	6.50E+01	2.54E-02	6.85E-01	1.09E+00	2.28E-01	0.00E+00	2.00E+00	5.48E-04	3.93E-02	2.04E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.90E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	1.15E-04	9.96E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	3.58E+02	1.16E+00	3.01E-01	1.44E-01	1.24E-02	0.00E+00	4.57E-01	2.50E-02	2.16E-01	6.98E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	2.77E+00	0.00E+00	2.26E-05	1.32E-02	0.00E+00	0.00E+00	1.32E-02	0.00E+00	1.67E-03	1.49E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	0.00E+00	8.89E-06	--	8.89E-06				
Fluoranthene	6.73E+01	1.76E-03	4.72E-01	6.63E-01	0.00E+00	0.00E+00	1.14E+00	3.80E-05	4.07E-02	1.18E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	1.64E+00	5.78E-04	2.81E-01	2.34E-02	0.00E+00	0.00E+00	3.04E-01	1.25E-05	9.92E-04	3.05E-01				
Phenanthrene	3.65E+01	5.53E-04	1.11E-01	2.03E-01	0.00E+00	0.00E+00	3.14E-01	1.19E-05	2.21E-02	3.36E-01				
Total LMW PAHs							1.77E+00	7.13E-05	6.54E-02	1.83E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	4.17E+01	5.75E-04	8.60E-03	2.15E-01	0.00E+00	0.00E+00	2.24E-01	1.24E-05	2.52E-02	2.49E-01				
Benzo[A]Pyrene	5.13E+01	1.94E-03	8.31E-02	2.21E-01	0.00E+00	0.00E+00	3.04E-01	4.19E-05	3.10E-02	3.35E-01				
Benzo(b)fluoranthene	5.74E+01	5.09E-03	2.50E-01	4.84E-01	0.00E+00	0.00E+00	7.34E-01	1.10E-04	3.47E-02	7.69E-01				
Benzo(g,h,i)perylene	4.28E+01	7.31E-04	4.70E-01	4.07E-01	0.00E+00	0.00E+00	8.78E-01	1.58E-05	2.59E-02	9.04E-01				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	4.90E+01	3.69E-03	9.46E-03	3.64E-01	0.00E+00	0.00E+00	3.73E-01	7.96E-05	2.96E-02	4.03E-01				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	0.00E+00	1.45E-06	--	1.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	0.00E+00	7.08E-06	--	7.08E-06				
Pyrene	6.36E+01	1.33E-03	6.43E-01	3.61E-01	0.00E+00	0.00E+00	1.00E+00	2.87E-05	3.85E-02	1.04E+00				
Total HMW PAHs							3.52E+00	3.00E-04	1.85E-01	3.70E+00	6.15E-01	6.02E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	0.00E+00	1.13E-04	--	1.13E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H16-7
Refined Exposure Evaluation - Grizzly Bear
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H16-8
Refined Exposure Evaluation - Long-tailed Weasel
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	2.88E+00	9.28E-04	0.00E+00	0.00E+00	7.40E-03	7.40E-03	4.78E-05	2.37E-03	9.81E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.14E+01	9.37E-04	0.00E+00	0.00E+00	4.97E-03	4.97E-03	4.82E-05	1.77E-02	2.27E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.83E+02	1.73E-01	0.00E+00	0.00E+00	6.43E-03	6.43E-03	8.90E-03	1.51E-01	1.66E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.93E+00	2.61E-04	0.00E+00	0.00E+00	8.02E-04	8.02E-04	1.34E-05	5.70E-03	6.52E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	6.80E-04	0.00E+00	0.00E+00	1.58E-02	1.58E-02	3.50E-05	9.61E-04	1.67E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.27E+01	2.97E-03	0.00E+00	0.00E+00	1.18E-01	1.18E-01	1.53E-04	1.87E-02	1.37E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.09E+01	1.78E-03	0.00E+00	0.00E+00	1.34E-02	1.34E-02	9.15E-05	8.97E-03	2.25E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.34E+02	9.09E-03	0.00E+00	0.00E+00	9.82E-01	9.82E-01	4.68E-04	4.39E-01	1.42E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.58E+01	1.75E-03	0.00E+00	0.00E+00	1.88E-01	1.88E-01	9.01E-05	1.30E-02	2.02E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.92E-03	0.00E+00	6.92E-03	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	7.51E-06	--	7.51E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.52E+02	3.96E-03	0.00E+00	0.00E+00	6.94E-01	6.94E-01	2.04E-04	3.72E-01	1.07E+00	1.70E+00	<1	1.48E+01	<1
Selenium	4.80E-01	7.23E-04	0.00E+00	0.00E+00	2.58E-02	2.58E-02	3.72E-05	3.95E-04	2.62E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	2.54E-04	0.00E+00	0.00E+00	1.03E-03	1.03E-03	1.31E-05	1.52E-04	1.20E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.51E+02	2.33E-03	0.00E+00	0.00E+00	9.53E-02	9.53E-02	1.20E-04	1.24E-01	2.19E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	0.00E+00	0.00E+00	5.37E+00	5.37E+00	1.30E-03	4.65E-02	5.42E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	1.42E-04	2.24E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	5.13E+02	1.16E+00	0.00E+00	0.00E+00	4.23E-01	4.23E-01	5.96E-02	4.23E-01	9.05E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.70E-04	8.70E-04				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	2.12E-05	--	2.12E-05				
Fluoranthene	1.64E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-05	1.35E-02	1.36E-02				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	5.04E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-05	4.15E-04	4.45E-04				
Phenanthrene	7.86E+00	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-05	6.48E-03	6.50E-03				
Total LMW PAHs						0.00E+00	1.70E-04	2.12E-02	2.14E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.11E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-05	9.14E-03	9.16E-03				
Benzo(A)Pyrene	1.40E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.97E-05	1.15E-02	1.16E-02				
Benzo(b)fluoranthene	1.55E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-04	1.28E-02	1.30E-02				
Benzo(g,h,i)perylene	1.36E+01	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-05	1.12E-02	1.13E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	1.28E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-04	1.05E-02	1.07E-02				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	3.45E-06	--	3.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.69E-05	--	1.69E-05				
Pyrene	1.61E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-05	1.33E-02	1.34E-02				
Total HMW PAHs						0.00E+00	7.15E-04	6.85E-02	6.92E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	2.70E-04	--	2.70E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H16-8
Refined Exposure Evaluation - Long-tailed Weasel
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-9
Refined Exposure Evaluation - Meadow Vole
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	2.88E+00	9.28E-04	1.60E-02	0.00E+00	0.00E+00	1.60E-02	1.39E-04	5.62E-03	2.17E-02	5.90E-02	<1	2.76E+00	<1
Arsenic	2.14E+01	9.37E-04	1.21E-01	0.00E+00	0.00E+00	1.21E-01	1.41E-04	4.19E-02	1.63E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.83E+02	1.73E-01	4.29E+00	0.00E+00	0.00E+00	4.29E+00	2.60E-02	3.58E-01	4.67E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	6.93E+00	2.61E-04	3.64E-01	0.00E+00	0.00E+00	3.64E-01	3.92E-05	1.35E-02	3.78E-01	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	6.80E-04	1.02E-01	0.00E+00	0.00E+00	1.02E-01	1.02E-04	2.28E-03	1.04E-01	7.70E-01	<1	6.87E+00	<1
Chromium	2.27E+01	2.97E-03	1.40E-01	0.00E+00	0.00E+00	1.40E-01	4.47E-04	4.42E-02	1.84E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.09E+01	1.78E-03	1.23E-02	0.00E+00	0.00E+00	1.23E-02	2.67E-04	2.13E-02	3.38E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.34E+02	9.09E-03	3.48E+00	0.00E+00	0.00E+00	3.48E+00	1.37E-03	1.04E+00	4.52E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.58E+01	1.75E-03	1.88E-01	0.00E+00	0.00E+00	1.88E-01	2.63E-04	3.10E-02	2.19E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-02	0.00E+00	2.02E-02	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.19E-05	--	2.19E-05	1.41E+00	<1	1.41E+01	<1
Nickel	4.52E+02	3.96E-03	1.58E+00	0.00E+00	0.00E+00	1.58E+00	5.95E-04	8.83E-01	2.46E+00	1.70E+00	1.45E+00	1.48E+01	<1
Selenium	4.80E-01	7.23E-04	3.40E-02	0.00E+00	0.00E+00	3.40E-02	1.09E-04	9.37E-04	3.50E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	2.54E-04	1.11E-04	0.00E+00	0.00E+00	1.11E-04	3.82E-05	3.61E-04	5.11E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.51E+02	2.33E-03	1.10E-01	0.00E+00	0.00E+00	1.10E-01	3.51E-04	2.94E-01	4.04E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	6.78E+00	0.00E+00	0.00E+00	6.78E+00	3.81E-03	1.10E-01	6.90E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	3.37E-04	6.47E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	5.13E+02	1.16E+00	4.63E+00	0.00E+00	0.00E+00	4.63E+00	1.74E-01	1.00E+00	5.80E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.06E+00	0.00E+00	5.51E-04	0.00E+00	0.00E+00	5.51E-04	0.00E+00	2.06E-03	2.61E-03				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.18E-05	--	6.18E-05				
Fluoranthene	1.64E+01	1.76E-03	1.23E+00	0.00E+00	0.00E+00	1.23E+00	2.64E-04	3.20E-02	1.26E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	5.04E-01	5.78E-04	9.23E-01	0.00E+00	0.00E+00	9.23E-01	8.69E-05	9.84E-04	9.24E-01				
Phenanthrene	7.86E+00	5.53E-04	4.57E-01	0.00E+00	0.00E+00	4.57E-01	8.31E-05	1.54E-02	4.73E-01				
Total LMW PAHs						2.61E+00	4.96E-04	5.04E-02	2.66E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.11E+01	5.75E-04	4.19E-02	0.00E+00	0.00E+00	4.19E-02	8.64E-05	2.17E-02	6.36E-02				
Benzo[A]Pyrene	1.40E+01	1.94E-03	2.50E-01	0.00E+00	0.00E+00	2.50E-01	2.91E-04	2.73E-02	2.78E-01				
Benzo(b)fluoranthene	1.55E+01	5.09E-03	7.22E-01	0.00E+00	0.00E+00	7.22E-01	7.65E-04	3.03E-02	7.53E-01				
Benzo(g,h,i)perylene	1.36E+01	7.31E-04	1.30E+00	0.00E+00	0.00E+00	1.30E+00	1.10E-04	2.67E-02	1.33E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	1.28E+01	3.69E-03	4.55E-02	0.00E+00	0.00E+00	4.55E-02	5.54E-04	2.49E-02	7.10E-02				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.01E-05	--	1.01E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.92E-05	--	4.92E-05				
Pyrene	1.61E+01	1.33E-03	1.75E+00	0.00E+00	0.00E+00	1.75E+00	2.00E-04	3.15E-02	1.78E+00				
Total HMW PAHs						4.11E+00	2.09E-03	1.62E-01	4.27E+00	6.15E-01	6.95E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	7.89E-04	--	7.89E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H16-9
Refined Exposure Evaluation - Meadow Vole
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-10
Refined Exposure Evaluation - North American Wolverine
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	2.88E+00	9.28E-04	0.00E+00	0.00E+00	4.32E-03	4.32E-03	2.79E-05	2.42E-03	6.77E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	2.14E+01	9.37E-04	0.00E+00	0.00E+00	2.90E-03	2.90E-03	2.81E-05	1.80E-02	2.10E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.83E+02	1.73E-01	0.00E+00	0.00E+00	3.75E-03	3.75E-03	5.19E-03	1.54E-01	1.63E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.93E+00	2.61E-04	0.00E+00	0.00E+00	4.68E-04	4.68E-04	7.84E-06	5.83E-03	6.30E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	6.80E-04	0.00E+00	0.00E+00	9.20E-03	9.20E-03	2.04E-05	9.82E-04	1.02E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.27E+01	2.97E-03	0.00E+00	0.00E+00	6.89E-02	6.89E-02	8.93E-05	1.91E-02	8.80E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	1.09E+01	1.78E-03	0.00E+00	0.00E+00	7.82E-03	7.82E-03	5.34E-05	9.16E-03	1.70E-02	7.33E+00	<1	1.89E+01	<1
Copper	5.34E+02	9.09E-03	0.00E+00	0.00E+00	5.73E-01	5.73E-01	2.73E-04	4.49E-01	1.02E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.58E+01	1.75E-03	0.00E+00	0.00E+00	1.10E-01	1.10E-01	5.26E-05	1.33E-02	1.23E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.04E-03	0.00E+00	4.04E-03	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.39E-06	--	4.39E-06	1.41E+00	<1	1.41E+01	<1
Nickel	4.52E+02	3.96E-03	0.00E+00	0.00E+00	4.05E-01	4.05E-01	1.19E-04	3.80E-01	7.86E-01	1.70E+00	<1	1.48E+01	<1
Selenium	4.80E-01	7.23E-04	0.00E+00	0.00E+00	1.50E-02	1.50E-02	2.17E-05	4.04E-04	1.55E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	2.54E-04	0.00E+00	0.00E+00	6.01E-04	6.01E-04	7.63E-06	1.56E-04	7.65E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.51E+02	2.33E-03	0.00E+00	0.00E+00	5.56E-02	5.56E-02	7.02E-05	1.27E-01	1.82E-01	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	0.00E+00	0.00E+00	3.14E+00	3.14E+00	7.62E-04	4.75E-02	3.18E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.45E-04	1.37E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	5.13E+02	1.16E+00	0.00E+00	0.00E+00	2.47E-01	2.47E-01	3.48E-02	4.32E-01	7.13E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.89E-04	8.89E-04				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.24E-05	--	1.24E-05				
Fluoranthene	1.64E+01	1.76E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.29E-05	1.38E-02	1.38E-02				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	5.04E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	4.24E-04	4.41E-04				
Phenanthrene	7.86E+00	5.53E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-05	6.62E-03	6.63E-03				
Total LMW PAHs						0.00E+00	9.92E-05	2.17E-02	2.18E-02	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.11E+01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	9.33E-03	9.35E-03				
Benzo[A]Pyrene	1.40E+01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-05	1.18E-02	1.18E-02				
Benzo(b)fluoranthene	1.55E+01	5.09E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-04	1.30E-02	1.32E-02				
Benzo(g,h,i)perylene	1.36E+01	7.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-05	1.15E-02	1.15E-02				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	1.28E+01	3.69E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-04	1.07E-02	1.09E-02				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.01E-06	--	2.01E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	9.85E-06	--	9.85E-06				
Pyrene	1.61E+01	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-05	1.36E-02	1.36E-02				
Total HMW PAHs						0.00E+00	4.18E-04	6.99E-02	7.04E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	1.58E-04	--	1.58E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H16-10
Refined Exposure Evaluation - North American Wolverine
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H16-11
Refined Exposure Evaluation - Short-tailed Shrew
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	2.88E+00	9.28E-04	0.00E+00	3.85E-01	0.00E+00	3.85E-01	1.24E-04	4.24E-03	3.90E-01	5.90E-02	6.60E+00	2.76E+00	<1
Arsenic	2.14E+01	9.37E-04	0.00E+00	2.82E-01	0.00E+00	2.82E-01	1.26E-04	3.16E-02	3.14E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.83E+02	1.73E-01	0.00E+00	2.23E+00	0.00E+00	2.23E+00	2.32E-02	2.70E-01	2.53E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	6.93E+00	2.61E-04	0.00E+00	4.18E-02	0.00E+00	4.18E-02	3.50E-05	1.02E-02	5.20E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	1.17E+00	6.80E-04	0.00E+00	1.26E+00	0.00E+00	1.26E+00	9.11E-05	1.72E-03	1.26E+00	7.70E-01	1.63E+00	6.87E+00	<1
Chromium	2.27E+01	2.97E-03	0.00E+00	9.29E-01	0.00E+00	9.29E-01	3.99E-04	3.34E-02	9.63E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	1.09E+01	1.78E-03	0.00E+00	1.78E-01	0.00E+00	1.78E-01	2.38E-04	1.61E-02	1.94E-01	7.33E+00	<1	1.89E+01	<1
Copper	5.34E+02	9.09E-03	0.00E+00	3.68E+01	0.00E+00	3.68E+01	1.22E-03	7.87E-01	3.76E+01	5.60E+00	6.72E+00	8.27E+01	<1
Lead	1.58E+01	1.75E-03	0.00E+00	1.00E+00	0.00E+00	1.00E+00	2.35E-04	2.34E-02	1.03E+00	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-02	0.00E+00	1.80E-02	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.96E-05	--	1.96E-05	1.41E+00	<1	1.41E+01	<1
Nickel	4.52E+02	3.96E-03	0.00E+00	4.71E+01	0.00E+00	4.71E+01	5.31E-04	6.66E-01	4.78E+01	1.70E+00	2.81E+01	1.48E+01	3.23E+00
Selenium	4.80E-01	7.23E-04	0.00E+00	7.26E-02	0.00E+00	7.26E-02	9.69E-05	7.08E-04	7.34E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.85E-01	2.54E-04	0.00E+00	1.34E-03	0.00E+00	1.34E-03	3.40E-05	2.73E-04	1.65E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.51E+02	2.33E-03	0.00E+00	8.47E-01	0.00E+00	8.47E-01	3.13E-04	2.22E-01	1.07E+00	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	0.00E+00	4.31E+01	0.00E+00	4.31E+01	3.40E-03	8.33E-02	4.31E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.73E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	2.54E-04	5.73E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	5.13E+02	1.16E+00	0.00E+00	8.53E+00	0.00E+00	8.53E+00	1.55E-01	7.57E-01	9.44E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	1.06E+00	0.00E+00	0.00E+00	2.08E-01	0.00E+00	2.08E-01	0.00E+00	1.56E-03	2.10E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	5.51E-05	--	5.51E-05				
Fluoranthene	1.64E+01	1.76E-03	0.00E+00	6.67E+00	0.00E+00	6.67E+00	2.36E-04	2.41E-02	6.70E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	5.04E-01	5.78E-04	0.00E+00	2.97E-01	0.00E+00	2.97E-01	7.75E-05	7.43E-04	2.98E-01				
Phenanthrene	7.86E+00	5.53E-04	0.00E+00	1.81E+00	0.00E+00	1.81E+00	7.41E-05	1.16E-02	1.82E+00				
Total LMW PAHs						8.99E+00	4.43E-04	3.80E-02	9.03E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.11E+01	5.75E-04	0.00E+00	2.36E+00	0.00E+00	2.36E+00	7.71E-05	1.64E-02	2.38E+00				
Benzo(A)Pyrene	1.40E+01	1.94E-03	0.00E+00	2.49E+00	0.00E+00	2.49E+00	2.60E-04	2.06E-02	2.51E+00				
Benzo(b)fluoranthene	1.55E+01	5.09E-03	0.00E+00	5.40E+00	0.00E+00	5.40E+00	6.82E-04	2.28E-02	5.42E+00				
Benzo(g,h,i)perylene	1.36E+01	7.31E-04	0.00E+00	5.38E+00	0.00E+00	5.38E+00	9.79E-05	2.01E-02	5.40E+00				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	1.28E+01	3.69E-03	0.00E+00	3.92E+00	0.00E+00	3.92E+00	4.94E-04	1.88E-02	3.94E+00				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	8.98E-06	--	8.98E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.39E-05	--	4.39E-05				
Pyrene	1.61E+01	1.33E-03	0.00E+00	3.79E+00	0.00E+00	3.79E+00	1.78E-04	2.38E-02	3.81E+00				
Total HMW PAHs						2.33E+01	1.86E-03	1.23E-01	2.35E+01	6.15E-01	3.82E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	7.04E-04	--	7.04E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H16-11
Refined Exposure Evaluation - Short-tailed Shrew
Industrial Landfill Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	6.38E+00	3.75E-02	2.40E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.94E-01	Sample et al. (1999)	Regression ^f	3.58E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	5.79E+02	1.56E-01	9.04E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	5.27E+01	Sample et al. (1998a)	6.83E-04	3.95E-01	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	4.23E-01	Regression ^a	3.89E-01	Bechtel-Jacobs (1998a)	Regression ^d	4.18E+00	Sample et al. (1999)	Regression ^f	1.90E-01	Sample et al. (1998b)
Chromium	NA	2.97E-03	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.78E-03	5.36E+00	7.50E-03	4.02E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	6.54E-01	Sample et al. (1998a)	Regression ^f	1.03E-01	Sample et al. (1998b)
Copper	NA	9.09E-03	1.33E+01	Regression ^a	5.41E+00	Bechtel-Jacobs (1998a)	5.15E-01	6.87E+00	Sample et al. (1998a)	Regression ^f	1.12E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.85E+01	Regression ^a	1.36E+00	Bechtel-Jacobs (1998a)	Regression ^d	8.46E+00	Sample et al. (1999)	Regression ^f	3.92E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	1.44E+03	7.90E-02	1.14E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	6.36E+01	Sample et al. (1999)	2.05E-02	2.96E+01	Sample et al. (1998b)
Mercury	NA	1.46E-04	4.62E-02	Regression ^a	6.94E-02	Bechtel-Jacobs (1998a)	3.93E+00	1.82E-01	Sample et al. (1998a)	3.81E-01	1.76E-02	LANL (2015)
Nickel	NA	3.96E-03	4.07E+01	Regression ^a	1.73E+00	Bechtel-Jacobs (1998a)	7.78E-01	3.16E+01	Sample et al. (1998a)	Regression ^f	4.39E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	6.40E-01	Regression ^a	3.10E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.69E-01	Sample et al. (1998a)	Regression ^f	5.58E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	1.16E-01	4.00E-03	4.65E-04	Baes et al. (1984)	5.41E-02	6.29E-03	USCHPPM (2004)	1.08E-01	1.26E-02	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	1.65E+01	4.85E-03	7.99E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.91E-01	Sample et al. (1998a)	1.23E-02	2.03E-01	Sample et al. (1998b) ^j
Zinc	NA	2.54E-02	8.04E+01	Regression ^a	5.49E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.61E+02	Sample et al. (1998a)	Regression ^f	1.07E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	2.98E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	5.75E-04	4.74E-01	Regression ^a	4.28E-02	USEPA (2007a)	1.59E+00	7.54E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	6.72E-01	Regression ^a	8.64E-02	USEPA (2007a)	1.33E+00	8.94E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H17-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(b)fluoranthene	6.2	5.09E-03	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	1.50E-01	2.38E-02	3.57E-03	USEPA (2007a)	5.44E+01	8.16E+00	USEPA (2007a)	7.79E-01	1.17E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j

Table H17-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ^j
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	a

Table H17-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H17-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	5.61E+00	3.75E-02	2.10E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.16E-01	Sample et al. (1999)	Regression ^f	3.22E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	3.81E+02	1.56E-01	5.94E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	3.46E+01	Sample et al. (1998a)	6.83E-04	2.60E-01	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	1.95E-01	Regression ^a	2.55E-01	Bechtel-Jacobs (1998a)	Regression ^d	2.26E+00	Sample et al. (1999)	Regression ^f	1.31E-01	Sample et al. (1998b)
Chromium	NA	2.97E-03	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.78E-03	4.99E+00	7.50E-03	3.74E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	6.08E-01	Sample et al. (1998a)	Regression ^f	9.37E-02	Sample et al. (1998b)
Copper	NA	9.09E-03	1.22E+01	Regression ^a	5.22E+00	Bechtel-Jacobs (1998a)	5.15E-01	6.26E+00	Sample et al. (1998a)	Regression ^f	1.11E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.26E+01	Regression ^a	1.10E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.23E+00	Sample et al. (1999)	Regression ^f	3.31E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	8.21E+02	7.90E-02	6.48E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	4.33E+01	Sample et al. (1999)	2.05E-02	1.68E+01	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	2.87E-02	Regression ^a	5.35E-02	Bechtel-Jacobs (1998a)	3.93E+00	1.13E-01	Sample et al. (1998a)	3.81E-01	1.09E-02	LANL (2015)
Nickel	NA	3.96E-03	1.62E+01	Regression ^a	8.71E-01	Bechtel-Jacobs (1998a)	7.78E-01	1.26E+01	Sample et al. (1998a)	Regression ^f	2.86E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	7.24E-02	4.00E-03	2.90E-04	Baes et al. (1984)	5.41E-02	3.92E-03	USCHPPM (2004)	1.08E-01	7.83E-03	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	1.29E+01	4.85E-03	6.25E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.41E-01	Sample et al. (1998a)	1.23E-02	1.59E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	6.05E+01	Regression ^a	4.69E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.29E+02	Sample et al. (1998a)	Regression ^f	1.05E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	1.74E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												

Table H17-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(a)anthracene	5.7	5.75E-04	1.96E-01	Regression ^a	2.53E-02	USEPA (2007a)	1.59E+00	3.11E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	3.08E-01	Regression ^a	4.03E-02	USEPA (2007a)	1.33E+00	4.09E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	6.25E-02	2.38E-02	1.49E-03	USEPA (2007a)	5.44E+01	3.40E+00	USEPA (2007a)	7.79E-01	4.87E-02	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H17-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H17-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Eastern Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H17-2
Refined Exposure Evaluation - American Woodcock
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.09E-04	--	1.09E-04	No TRV	--	No TRV	--
Arsenic	6.38E+00	9.37E-04	2.81E-03	9.45E-02	0.00E+00	9.73E-02	1.10E-04	5.62E-02	1.54E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.79E+02	1.73E-01	1.06E+00	5.57E+00	0.00E+00	6.64E+00	2.03E-02	5.11E+00	1.18E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.07E-05	--	3.07E-05	No TRV	--	No TRV	--
Cadmium	4.23E-01	6.80E-04	4.57E-03	4.42E-01	0.00E+00	4.47E-01	7.99E-05	3.73E-03	4.50E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.49E-04	--	3.49E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.36E+00	1.78E-03	4.72E-04	6.92E-02	0.00E+00	6.96E-02	2.09E-04	4.72E-02	1.17E-01	7.61E+00	<1	2.02E+01	<1
Copper	1.33E+01	9.09E-03	6.36E-02	7.26E-01	0.00E+00	7.90E-01	1.07E-03	1.17E-01	9.08E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	1.75E-03	1.60E-02	8.95E-01	0.00E+00	9.11E-01	2.06E-04	1.63E-01	1.07E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.44E+03	1.34E-01	1.34E+00	6.72E+00	0.00E+00	8.06E+00	1.58E-02	1.27E+01	2.08E+01	1.79E+02	<1	3.77E+02	<1
Mercury	4.62E-02	1.46E-04	8.15E-04	1.92E-02	0.00E+00	2.00E-02	1.72E-05	4.07E-04	2.04E-02	4.50E-01	<1	9.10E-01	<1
Nickel	4.07E+01	3.96E-03	2.03E-02	3.35E+00	0.00E+00	3.37E+00	4.65E-04	3.58E-01	3.73E+00	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	7.23E-04	3.65E-03	7.07E-02	0.00E+00	7.44E-02	8.49E-05	5.64E-03	8.01E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.16E-01	2.54E-04	5.47E-06	6.66E-04	0.00E+00	6.71E-04	2.98E-05	1.03E-03	1.73E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.65E+01	2.33E-03	9.38E-04	7.31E-02	0.00E+00	7.41E-02	2.74E-04	1.45E-01	2.19E-01	3.44E-01	<1	1.70E+00	<1
Zinc	8.04E+01	2.54E-02	6.45E-01	3.81E+01	0.00E+00	3.88E+01	2.98E-03	7.08E-01	3.95E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.98E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	2.62E-03	7.42E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.36E-01	--	1.36E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.83E-05	--	4.83E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.07E-04	--	2.07E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	6.79E-05	--	6.79E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.50E-05	--	6.50E-05				
Total LMW PAHs						0.00E+00	3.88E-04	0.00E+00	3.88E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.74E-01	5.75E-04	5.03E-04	7.97E-02	0.00E+00	8.02E-02	6.76E-05	4.18E-03	8.44E-02				
Benzo[A]Pyrene	6.72E-01	1.94E-03	1.02E-03	9.46E-02	0.00E+00	9.56E-02	2.28E-04	5.92E-03	1.02E-01				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.98E-04	--	5.98E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.58E-05	--	8.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.33E-04	--	4.33E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.87E-06	--	7.87E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.85E-05	--	3.85E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.56E-04	--	1.56E-04				
Total HMW PAHs						1.76E-01	1.63E-03	1.01E-02	1.88E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	5.25E-03	4.19E-05	8.63E-01	0.00E+00	8.63E-01	6.17E-04	1.32E-03	8.65E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H17-2
Refined Exposure Evaluation - American Woodcock
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-3
Refined Exposure Evaluation - Mourning Dove
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.06E-04	--	1.06E-04	No TRV	--	No TRV	--
Arsenic	6.38E+00	9.37E-04	2.73E-02	0.00E+00	0.00E+00	2.73E-02	1.07E-04	4.95E-02	7.70E-02	2.24E+00	<1	4.51E+00	<1
Barium	5.79E+02	1.73E-01	1.03E+01	0.00E+00	0.00E+00	1.03E+01	1.97E-02	4.50E+00	1.48E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.98E-05	--	2.98E-05	No TRV	--	No TRV	--
Cadmium	4.23E-01	6.80E-04	4.44E-02	0.00E+00	0.00E+00	4.44E-02	7.76E-05	3.29E-03	4.78E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.39E-04	--	3.39E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.36E+00	1.78E-03	4.59E-03	0.00E+00	0.00E+00	4.59E-03	2.03E-04	4.16E-02	4.64E-02	7.61E+00	<1	2.02E+01	<1
Copper	1.33E+01	9.09E-03	6.18E-01	0.00E+00	0.00E+00	6.18E-01	1.04E-03	1.04E-01	7.22E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	1.75E-03	1.55E-01	0.00E+00	0.00E+00	1.55E-01	2.00E-04	1.43E-01	2.99E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.44E+03	1.34E-01	1.30E+01	0.00E+00	0.00E+00	1.30E+01	1.53E-02	1.12E+01	2.42E+01	1.79E+02	<1	3.77E+02	<1
Mercury	4.62E-02	1.46E-04	7.92E-03	0.00E+00	0.00E+00	7.92E-03	1.67E-05	3.59E-04	8.29E-03	4.50E-01	<1	9.10E-01	<1
Nickel	4.07E+01	3.96E-03	1.98E-01	0.00E+00	0.00E+00	1.98E-01	4.52E-04	3.16E-01	5.14E-01	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	7.23E-04	3.54E-02	0.00E+00	0.00E+00	3.54E-02	8.25E-05	4.97E-03	4.05E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.16E-01	2.54E-04	5.31E-05	0.00E+00	0.00E+00	5.31E-05	2.90E-05	9.03E-04	9.85E-04	3.50E-01	<1	3.50E+00	<1
Vanadium	1.65E+01	2.33E-03	9.11E-03	0.00E+00	0.00E+00	9.11E-03	2.66E-04	1.28E-01	1.37E-01	3.44E-01	<1	1.70E+00	<1
Zinc	8.04E+01	2.54E-02	6.27E+00	0.00E+00	0.00E+00	6.27E+00	2.89E-03	6.24E-01	6.89E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.98E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	2.31E-03	6.97E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.32E-01	--	1.32E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.70E-05	--	4.70E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	6.60E-05	--	6.60E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.31E-05	--	6.31E-05				
Total LMW PAHs						0.00E+00	3.77E-04	0.00E+00	3.77E-04	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.74E-01	5.75E-04	4.88E-03	0.00E+00	0.00E+00	4.88E-03	6.56E-05	3.68E-03	8.63E-03				
Benzo(A)Pyrene	6.72E-01	1.94E-03	9.86E-03	0.00E+00	0.00E+00	9.86E-03	2.21E-04	5.22E-03	1.53E-02				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.81E-04	--	5.81E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.34E-05	--	8.34E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.21E-04	--	4.21E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.65E-06	--	7.65E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.74E-05	--	3.74E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.52E-04	--	1.52E-04				
Total HMW PAHs						1.47E-02	1.59E-03	8.90E-03	2.52E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	5.25E-03	4.07E-04	0.00E+00	0.00E+00	4.07E-04	5.99E-04	1.16E-03	2.17E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--

Table H17-3
Refined Exposure Evaluation - Mourning Dove
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-4
Refined Exposure Evaluation - Red-tailed Hawk
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	7.61E-05	--	7.61E-05	No TRV	--	No TRV	--
Arsenic	6.38E+00	9.37E-04	0.00E+00	0.00E+00	2.94E-03	2.94E-03	7.68E-05	1.36E-02	1.66E-02	2.24E+00	<1	4.51E+00	<1
Barium	5.79E+02	1.73E-01	0.00E+00	0.00E+00	3.24E-02	3.24E-02	1.42E-02	1.24E+00	1.28E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.14E-05	--	2.14E-05	No TRV	--	No TRV	--
Cadmium	4.23E-01	6.80E-04	0.00E+00	0.00E+00	1.55E-02	1.55E-02	5.58E-05	9.03E-04	1.65E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	2.44E-04	--	2.44E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.36E+00	1.78E-03	0.00E+00	0.00E+00	8.46E-03	8.46E-03	1.46E-04	1.14E-02	2.00E-02	7.61E+00	<1	2.02E+01	<1
Copper	1.33E+01	9.09E-03	0.00E+00	0.00E+00	9.19E-01	9.19E-01	7.45E-04	2.84E-02	9.48E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	1.75E-03	0.00E+00	0.00E+00	3.21E-01	3.21E-01	1.44E-04	3.94E-02	3.61E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.44E+03	1.34E-01	0.00E+00	0.00E+00	2.43E+00	2.43E+00	1.10E-02	3.08E+00	5.51E+00	1.79E+02	<1	3.77E+02	<1
Mercury	4.62E-02	1.46E-04	0.00E+00	0.00E+00	1.44E-03	1.44E-03	1.20E-05	9.85E-05	1.55E-03	4.50E-01	<1	9.10E-01	<1
Nickel	4.07E+01	3.96E-03	0.00E+00	0.00E+00	3.60E-01	3.60E-01	3.25E-04	8.67E-02	4.47E-01	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	7.23E-04	0.00E+00	0.00E+00	4.57E-02	4.57E-02	5.93E-05	1.36E-03	4.72E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.16E-01	2.54E-04	0.00E+00	0.00E+00	1.03E-03	1.03E-03	2.08E-05	2.48E-04	1.30E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.65E+01	2.33E-03	0.00E+00	0.00E+00	1.66E-02	1.66E-02	1.91E-04	3.51E-02	5.19E-02	3.44E-01	<1	1.70E+00	<1
Zinc	8.04E+01	2.54E-02	0.00E+00	0.00E+00	8.78E+00	8.78E+00	2.08E-03	1.71E-01	8.95E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.98E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	6.35E-04	3.98E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	9.49E-02	--	9.49E-02	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	3.37E-05	--	3.37E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	1.44E-04	--	1.44E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	4.74E-05	--	4.74E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	4.54E-05	--	4.54E-05				
Total LMW PAHs						0.00E+00	2.71E-04	0.00E+00	2.71E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.74E-01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-05	1.01E-03	1.06E-03				
Benzo(A)Pyrene	6.72E-01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-04	1.43E-03	1.59E-03				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	4.17E-04	--	4.17E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	5.99E-05	--	5.99E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	3.02E-04	--	3.02E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	5.49E-06	--	5.49E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	2.69E-05	--	2.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.09E-04	--	1.09E-04				
Total HMW PAHs						0.00E+00	1.14E-03	2.44E-03	3.58E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	5.25E-03	0.00E+00	0.00E+00	9.58E-03	9.58E-03	4.31E-04	3.20E-04	1.03E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H17-4
Refined Exposure Evaluation - Red-tailed Hawk
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.47E-04	--	1.47E-04	No TRV	--	No TRV	--
Arsenic	6.38E+00	9.37E-04	0.00E+00	1.42E-01	0.00E+00	1.42E-01	1.48E-04	0.00E+00	1.42E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.79E+02	1.73E-01	0.00E+00	8.35E+00	0.00E+00	8.35E+00	2.74E-02	0.00E+00	8.38E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	4.13E-05	--	4.13E-05	No TRV	--	No TRV	--
Cadmium	4.23E-01	6.80E-04	0.00E+00	6.62E-01	0.00E+00	6.62E-01	1.08E-04	0.00E+00	6.62E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.71E-04	--	4.71E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.36E+00	1.78E-03	0.00E+00	1.04E-01	0.00E+00	1.04E-01	2.82E-04	0.00E+00	1.04E-01	7.61E+00	<1	2.02E+01	<1
Copper	1.33E+01	9.09E-03	0.00E+00	1.09E+00	0.00E+00	1.09E+00	1.44E-03	0.00E+00	1.09E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.85E+01	1.75E-03	0.00E+00	1.34E+00	0.00E+00	1.34E+00	2.77E-04	0.00E+00	1.34E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.44E+03	1.34E-01	0.00E+00	1.01E+01	0.00E+00	1.01E+01	2.13E-02	0.00E+00	1.01E+01	1.79E+02	<1	3.77E+02	<1
Mercury	4.62E-02	1.46E-04	0.00E+00	2.88E-02	0.00E+00	2.88E-02	2.31E-05	0.00E+00	2.88E-02	4.50E-01	<1	9.10E-01	<1
Nickel	4.07E+01	3.96E-03	0.00E+00	5.01E+00	0.00E+00	5.01E+00	6.27E-04	0.00E+00	5.01E+00	6.71E+00	<1	1.86E+01	<1
Selenium	6.40E-01	7.23E-04	0.00E+00	1.06E-01	0.00E+00	1.06E-01	1.14E-04	0.00E+00	1.06E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.16E-01	2.54E-04	0.00E+00	9.97E-04	0.00E+00	9.97E-04	4.02E-05	0.00E+00	1.04E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.65E+01	2.33E-03	0.00E+00	1.09E-01	0.00E+00	1.09E-01	3.70E-04	0.00E+00	1.10E-01	3.44E-01	<1	1.70E+00	<1
Zinc	8.04E+01	2.54E-02	0.00E+00	5.71E+01	0.00E+00	5.71E+01	4.01E-03	0.00E+00	5.71E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.98E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.83E-01	--	1.83E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.52E-05	--	6.52E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	9.15E-05	--	9.15E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.76E-05	--	8.76E-05				
Total LMW PAHs						0.00E+00	5.23E-04	0.00E+00	5.23E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.74E-01	5.75E-04	0.00E+00	1.19E-01	0.00E+00	1.19E-01	9.11E-05	0.00E+00	1.19E-01				
Benzo(A)Pyrene	6.72E-01	1.94E-03	0.00E+00	1.42E-01	0.00E+00	1.42E-01	3.07E-04	0.00E+00	1.42E-01				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	8.06E-04	--	8.06E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.16E-04	--	1.16E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.84E-04	--	5.84E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.06E-05	--	1.06E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	5.19E-05	--	5.19E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.11E-04	--	2.11E-04				
Total HMW PAHs						2.61E-01	2.20E-03	0.00E+00	2.63E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	5.25E-03	0.00E+00	1.29E+00	0.00E+00	1.29E+00	8.31E-04	0.00E+00	1.29E+00	1.10E+00	1.18E+00	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H17-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-6
Refined Exposure Evaluation - Canada Lynx
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	2.90E-05	--	2.90E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.38E+00	9.37E-04	0.00E+00	0.00E+00	1.12E-03	1.12E-03	2.93E-05	5.58E-03	6.73E-03	1.04E+00	<1	4.55E+00	<1
Barium	5.79E+02	1.73E-01	0.00E+00	0.00E+00	1.24E-02	1.24E-02	5.40E-03	5.07E-01	5.25E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	8.15E-06	--	8.15E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	4.23E-01	6.80E-04	0.00E+00	0.00E+00	5.92E-03	5.92E-03	2.12E-05	3.70E-04	6.31E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	9.29E-05	--	9.29E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	5.36E+00	1.78E-03	0.00E+00	0.00E+00	3.22E-03	3.22E-03	5.56E-05	4.69E-03	7.97E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.33E+01	9.09E-03	0.00E+00	0.00E+00	3.50E-01	3.50E-01	2.84E-04	1.17E-02	3.62E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	1.75E-03	0.00E+00	0.00E+00	1.22E-01	1.22E-01	5.47E-05	1.62E-02	1.39E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.44E+03	1.34E-01	0.00E+00	0.00E+00	9.24E-01	9.24E-01	4.20E-03	1.26E+00	2.19E+00	5.15E+01	<1	1.46E+02	<1
Mercury	4.62E-02	1.46E-04	0.00E+00	0.00E+00	5.50E-04	5.50E-04	4.56E-06	4.04E-05	5.95E-04	1.41E+00	<1	1.41E+01	<1
Nickel	4.07E+01	3.96E-03	0.00E+00	0.00E+00	1.37E-01	1.37E-01	1.24E-04	3.56E-02	1.73E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	7.23E-04	0.00E+00	0.00E+00	1.74E-02	1.74E-02	2.26E-05	5.60E-04	1.80E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.16E-01	2.54E-04	0.00E+00	0.00E+00	3.93E-04	3.93E-04	7.94E-06	1.02E-04	5.03E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.65E+01	2.33E-03	0.00E+00	0.00E+00	6.33E-03	6.33E-03	7.29E-05	1.44E-02	2.08E-02	4.16E+00	<1	9.44E+00	<1
Zinc	8.04E+01	2.54E-02	0.00E+00	0.00E+00	3.34E+00	3.34E+00	7.92E-04	7.03E-02	3.41E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.98E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	2.61E-04	1.54E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.62E-02	--	3.62E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.29E-05	--	1.29E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.50E-05	--	5.50E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	1.81E-05	--	1.81E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Total LMW PAHs						0.00E+00	1.03E-04	0.00E+00	1.03E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	4.74E-01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05	4.15E-04	4.33E-04				
Benzo(A)Pyrene	6.72E-01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-05	5.88E-04	6.49E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.28E-05	--	2.28E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.15E-04	--	1.15E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.09E-06	--	2.09E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.02E-05	--	1.02E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.16E-05	--	4.16E-05				
Total HMW PAHs						0.00E+00	4.34E-04	1.00E-03	1.44E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	5.25E-03	0.00E+00	0.00E+00	3.65E-03	3.65E-03	1.64E-04	1.31E-04	3.95E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H17-6
Refined Exposure Evaluation - Canada Lynx
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-7
Refined Exposure Evaluation - Grizzly Bear
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	0.00E+00	2.00E-05	--	2.00E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.38E+00	9.37E-04	3.36E-03	2.90E-03	7.74E-05	0.00E+00	6.34E-03	2.02E-05	3.86E-03	1.02E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.79E+02	1.73E-01	1.27E+00	1.71E-01	8.54E-04	0.00E+00	1.44E+00	3.73E-03	3.50E-01	1.79E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	0.00E+00	5.64E-06	--	5.64E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	4.23E-01	6.80E-04	5.46E-03	1.35E-02	4.09E-04	0.00E+00	1.94E-02	1.47E-05	2.56E-04	1.97E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	0.00E+00	6.42E-05	--	6.42E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	5.36E+00	1.78E-03	5.65E-04	2.12E-03	2.23E-04	0.00E+00	2.91E-03	3.84E-05	3.24E-03	6.19E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.33E+01	9.09E-03	7.60E-02	2.22E-02	2.42E-02	0.00E+00	1.22E-01	1.96E-04	8.06E-03	1.31E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.85E+01	1.75E-03	1.91E-02	2.74E-02	8.46E-03	0.00E+00	5.50E-02	3.78E-05	1.12E-02	6.62E-02	4.70E+00	<1	1.86E+02	<1
Manganese	1.44E+03	1.34E-01	1.60E+00	2.06E-01	6.39E-02	0.00E+00	1.87E+00	2.90E-03	8.72E-01	2.74E+00	5.15E+01	<1	1.46E+02	<1
Mercury	4.62E-02	1.46E-04	9.74E-04	5.88E-04	3.80E-05	0.00E+00	1.60E-03	3.15E-06	2.79E-05	1.63E-03	1.41E+00	<1	1.41E+01	<1
Nickel	4.07E+01	3.96E-03	2.43E-02	1.03E-01	9.49E-03	0.00E+00	1.36E-01	8.55E-05	2.46E-02	1.61E-01	1.70E+00	<1	1.48E+01	<1
Selenium	6.40E-01	7.23E-04	4.36E-03	2.17E-03	1.20E-03	0.00E+00	7.73E-03	1.56E-05	3.87E-04	8.13E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.16E-01	2.54E-04	6.53E-06	2.04E-05	2.72E-05	0.00E+00	5.41E-05	5.49E-06	7.04E-05	1.30E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.65E+01	2.33E-03	1.12E-03	2.24E-03	4.37E-04	0.00E+00	3.80E-03	5.04E-05	9.96E-03	1.38E-02	4.16E+00	<1	9.44E+00	<1
Zinc	8.04E+01	2.54E-02	7.71E-01	1.17E+00	2.31E-01	0.00E+00	2.17E+00	5.48E-04	4.86E-02	2.22E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	2.98E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	1.80E-04	1.06E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	0.00E+00	2.50E-02	--	2.50E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	0.00E+00	8.89E-06	--	8.89E-06				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	0.00E+00	3.80E-05	--	3.80E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	0.00E+00	1.25E-05	--	1.25E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	0.00E+00	1.19E-05	--	1.19E-05				
Total LMW PAHs							0.00E+00	7.13E-05	0.00E+00	7.13E-05	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	4.74E-01	5.75E-04	6.01E-04	2.44E-03	0.00E+00	0.00E+00	3.04E-03	1.24E-05	2.87E-04	3.34E-03				
Benzo[A]Pyrene	6.72E-01	1.94E-03	1.21E-03	2.90E-03	0.00E+00	0.00E+00	4.11E-03	4.19E-05	4.07E-04	4.56E-03				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	0.00E+00	1.58E-05	--	1.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	0.00E+00	7.96E-05	--	7.96E-05				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	0.00E+00	1.45E-06	--	1.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	0.00E+00	7.08E-06	--	7.08E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	0.00E+00	2.87E-05	--	2.87E-05				
Total HMW PAHs							7.15E-03	3.00E-04	6.93E-04	8.15E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.50E-01	5.25E-03	5.01E-05	2.64E-02	2.52E-04	0.00E+00	2.67E-02	1.13E-04	9.07E-05	2.69E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H17-7
Refined Exposure Evaluation - Grizzly Bear
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-8
Refined Exposure Evaluation - Long-tailed Weasel
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	4.78E-05	--	4.78E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	5.61E+00	9.37E-04	0.00E+00	0.00E+00	1.66E-03	1.66E-03	4.82E-05	4.62E-03	6.33E-03	1.04E+00	<1	4.55E+00	<1
Barium	3.81E+02	1.73E-01	0.00E+00	0.00E+00	1.34E-02	1.34E-02	8.90E-03	3.13E-01	3.36E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.95E-01	6.80E-04	0.00E+00	0.00E+00	6.76E-03	6.76E-03	3.50E-05	1.60E-04	6.95E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	4.99E+00	1.78E-03	0.00E+00	0.00E+00	4.82E-03	4.82E-03	9.15E-05	4.10E-03	9.02E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.22E+01	9.09E-03	0.00E+00	0.00E+00	5.69E-01	5.69E-01	4.68E-04	1.00E-02	5.79E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	0.00E+00	0.00E+00	1.71E-01	1.71E-01	9.01E-05	1.04E-02	1.81E-01	4.70E+00	<1	1.86E+02	<1
Manganese	8.21E+02	1.34E-01	0.00E+00	0.00E+00	8.66E-01	8.66E-01	6.92E-03	6.76E-01	1.55E+00	5.15E+01	<1	1.46E+02	<1
Mercury	2.87E-02	1.46E-04	0.00E+00	0.00E+00	5.63E-04	5.63E-04	7.51E-06	2.36E-05	5.94E-04	1.41E+00	<1	1.41E+01	<1
Nickel	1.62E+01	3.96E-03	0.00E+00	0.00E+00	1.47E-01	1.47E-01	2.04E-04	1.34E-02	1.61E-01	1.70E+00	<1	1.48E+01	<1
Selenium	ND	7.23E-04	--	--	--	0.00E+00	3.72E-05	--	3.72E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	7.24E-02	2.54E-04	0.00E+00	0.00E+00	4.03E-04	4.03E-04	1.31E-05	5.96E-05	4.76E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.29E+01	2.33E-03	0.00E+00	0.00E+00	8.16E-03	8.16E-03	1.20E-04	1.06E-02	1.89E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.05E+01	2.54E-02	0.00E+00	0.00E+00	5.40E+00	5.40E+00	1.30E-03	4.98E-02	5.45E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.74E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	1.43E-04	2.24E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	5.96E-02	--	5.96E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	2.12E-05	--	2.12E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	9.06E-05	--	9.06E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	2.85E-05	--	2.85E-05				
Total LMW PAHs						0.00E+00	1.70E-04	0.00E+00	1.70E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.96E-01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.96E-05	1.61E-04	1.91E-04				
Benzo(A)Pyrene	3.08E-01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.97E-05	2.53E-04	3.53E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	2.62E-04	--	2.62E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	3.76E-05	--	3.76E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.90E-04	--	1.90E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	3.45E-06	--	3.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.69E-05	--	1.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	6.84E-05	--	6.84E-05				
Total HMW PAHs						0.00E+00	7.15E-04	4.14E-04	1.13E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.25E-02	5.25E-03	0.00E+00	0.00E+00	2.51E-03	2.51E-03	2.70E-04	5.15E-05	2.83E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H17-8
Refined Exposure Evaluation - Long-tailed Weasel
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-9
 Refined Exposure Evaluation - Meadow Vole
 Eastern Undeveloped Area
 Baseline Ecological Risk Assessment
 Columbia Falls Aluminum Company
 Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.39E-04	--	1.39E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	5.61E+00	9.37E-04	3.16E-02	0.00E+00	0.00E+00	3.16E-02	1.41E-04	1.10E-02	4.27E-02	1.04E+00	<1	4.55E+00	<1
Barium	3.81E+02	1.73E-01	8.92E+00	0.00E+00	0.00E+00	8.92E+00	2.60E-02	7.43E-01	9.69E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.92E-05	--	3.92E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.95E-01	6.80E-04	3.82E-02	0.00E+00	0.00E+00	3.82E-02	1.02E-04	3.80E-04	3.87E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.47E-04	--	4.47E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	4.99E+00	1.78E-03	5.62E-03	0.00E+00	0.00E+00	5.62E-03	2.67E-04	9.74E-03	1.56E-02	7.33E+00	<1	1.89E+01	<1
Copper	1.22E+01	9.09E-03	7.84E-01	0.00E+00	0.00E+00	7.84E-01	1.37E-03	2.37E-02	8.09E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	1.65E-01	0.00E+00	0.00E+00	1.65E-01	2.63E-04	2.47E-02	1.90E-01	4.70E+00	<1	1.86E+02	<1
Manganese	8.21E+02	1.34E-01	9.74E+00	0.00E+00	0.00E+00	9.74E+00	2.02E-02	1.60E+00	1.14E+01	5.15E+01	<1	1.46E+02	<1
Mercury	2.87E-02	1.46E-04	8.04E-03	0.00E+00	0.00E+00	8.04E-03	2.19E-05	5.61E-05	8.12E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.62E+01	3.96E-03	1.31E-01	0.00E+00	0.00E+00	1.31E-01	5.95E-04	3.17E-02	1.63E-01	1.70E+00	<1	1.48E+01	<1
Selenium	ND	7.23E-04	--	--	--	0.00E+00	1.09E-04	--	1.09E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	7.24E-02	2.54E-04	4.35E-05	0.00E+00	0.00E+00	4.35E-05	3.82E-05	1.41E-04	2.23E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.29E+01	2.33E-03	9.39E-03	0.00E+00	0.00E+00	9.39E-03	3.51E-04	2.52E-02	3.49E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.05E+01	2.54E-02	7.05E+00	0.00E+00	0.00E+00	7.05E+00	3.81E-03	1.18E-01	7.17E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.74E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	3.39E-04	6.47E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.74E-01	--	1.74E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.18E-05	--	6.18E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.64E-04	--	2.64E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	8.69E-05	--	8.69E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Total LMW PAHs						0.00E+00	4.96E-04	0.00E+00	4.96E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.96E-01	5.75E-04	3.80E-03	0.00E+00	0.00E+00	3.80E-03	8.64E-05	3.82E-04	4.27E-03				
Benzo(A)Pyrene	3.08E-01	1.94E-03	6.06E-03	0.00E+00	0.00E+00	6.06E-03	2.91E-04	6.01E-04	6.95E-03				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	7.65E-04	--	7.65E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.54E-04	--	5.54E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.01E-05	--	1.01E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.92E-05	--	4.92E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.00E-04	--	2.00E-04				
Total HMW PAHs						9.86E-03	2.09E-03	9.83E-04	1.29E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.25E-02	5.25E-03	2.23E-04	0.00E+00	0.00E+00	2.23E-04	7.89E-04	1.22E-04	1.13E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H17-9
Refined Exposure Evaluation - Meadow Vole
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-10
Refined Exposure Evaluation - North American Wolverine
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	2.79E-05	--	2.79E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	5.61E+00	9.37E-04	0.00E+00	0.00E+00	9.68E-04	9.68E-04	2.81E-05	4.72E-03	5.72E-03	1.04E+00	<1	4.55E+00	<1
Barium	3.81E+02	1.73E-01	0.00E+00	0.00E+00	7.80E-03	7.80E-03	5.19E-03	3.20E-01	3.33E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	7.84E-06	--	7.84E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	1.95E-01	6.80E-04	0.00E+00	0.00E+00	3.95E-03	3.95E-03	2.04E-05	1.64E-04	4.13E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	8.93E-05	--	8.93E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	4.99E+00	1.78E-03	0.00E+00	0.00E+00	2.82E-03	2.82E-03	5.34E-05	4.19E-03	7.06E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.22E+01	9.09E-03	0.00E+00	0.00E+00	3.32E-01	3.32E-01	2.73E-04	1.02E-02	3.43E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	0.00E+00	0.00E+00	9.96E-02	9.96E-02	5.26E-05	1.06E-02	1.10E-01	4.70E+00	<1	1.86E+02	<1
Manganese	8.21E+02	1.34E-01	0.00E+00	0.00E+00	5.05E-01	5.05E-01	4.04E-03	6.90E-01	1.20E+00	5.15E+01	<1	1.46E+02	<1
Mercury	2.87E-02	1.46E-04	0.00E+00	0.00E+00	3.29E-04	3.29E-04	4.39E-06	2.41E-05	3.57E-04	1.41E+00	<1	1.41E+01	<1
Nickel	1.62E+01	3.96E-03	0.00E+00	0.00E+00	8.61E-02	8.61E-02	1.19E-04	1.37E-02	9.98E-02	1.70E+00	<1	1.48E+01	<1
Selenium	ND	7.23E-04	--	--	--	0.00E+00	2.17E-05	--	2.17E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	7.24E-02	2.54E-04	0.00E+00	0.00E+00	2.35E-04	2.35E-04	7.63E-06	6.09E-05	3.04E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.29E+01	2.33E-03	0.00E+00	0.00E+00	4.76E-03	4.76E-03	7.02E-05	1.08E-02	1.57E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.05E+01	2.54E-02	0.00E+00	0.00E+00	3.15E+00	3.15E+00	7.62E-04	5.09E-02	3.20E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.74E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.46E-04	1.37E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.48E-02	--	3.48E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.24E-05	--	1.24E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.29E-05	--	5.29E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	1.74E-05	--	1.74E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.66E-05	--	1.66E-05				
Total LMW PAHs						0.00E+00	9.92E-05	0.00E+00	9.92E-05	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.96E-01	5.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-05	1.65E-04	1.82E-04				
Benzo(A)Pyrene	3.08E-01	1.94E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-05	2.59E-04	3.17E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.20E-05	--	2.20E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.11E-04	--	1.11E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.01E-06	--	2.01E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	9.85E-06	--	9.85E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.00E-05	--	4.00E-05				
Total HMW PAHs						0.00E+00	4.18E-04	4.23E-04	8.41E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.25E-02	5.25E-03	0.00E+00	0.00E+00	1.46E-03	1.46E-03	1.58E-04	5.26E-05	1.67E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H17-10
Refined Exposure Evaluation - North American Wolverine
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H17-11
Refined Exposure Evaluation - Short-tailed Shrew
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.24E-04	--	1.24E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	5.61E+00	9.37E-04	0.00E+00	1.09E-01	0.00E+00	1.09E-01	1.26E-04	8.27E-03	1.18E-01	1.04E+00	<1	4.55E+00	<1
Barium	3.81E+02	1.73E-01	0.00E+00	4.64E+00	0.00E+00	4.64E+00	2.32E-02	5.61E-01	5.22E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.50E-05	--	3.50E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	1.95E-01	6.80E-04	0.00E+00	3.02E-01	0.00E+00	3.02E-01	9.11E-05	2.87E-04	3.03E-01	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.99E-04	--	3.99E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	4.99E+00	1.78E-03	0.00E+00	8.15E-02	0.00E+00	8.15E-02	2.38E-04	7.35E-03	8.91E-02	7.33E+00	<1	1.89E+01	<1
Copper	1.22E+01	9.09E-03	0.00E+00	8.39E-01	0.00E+00	8.39E-01	1.22E-03	1.79E-02	8.58E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	0.00E+00	8.35E-01	0.00E+00	8.35E-01	2.35E-04	1.86E-02	8.54E-01	4.70E+00	<1	1.86E+02	<1
Manganese	8.21E+02	1.34E-01	0.00E+00	5.80E+00	0.00E+00	5.80E+00	1.80E-02	1.21E+00	7.03E+00	5.15E+01	<1	1.46E+02	<1
Mercury	2.87E-02	1.46E-04	0.00E+00	1.51E-02	0.00E+00	1.51E-02	1.96E-05	4.23E-05	1.52E-02	1.41E+00	<1	1.41E+01	<1
Nickel	1.62E+01	3.96E-03	0.00E+00	1.69E+00	0.00E+00	1.69E+00	5.31E-04	2.39E-02	1.72E+00	1.70E+00	1.01E+00	1.48E+01	<1
Selenium	ND	7.23E-04	--	--	--	0.00E+00	9.69E-05	--	9.69E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	7.24E-02	2.54E-04	0.00E+00	5.25E-04	0.00E+00	5.25E-04	3.40E-05	1.07E-04	6.66E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.29E+01	2.33E-03	0.00E+00	7.25E-02	0.00E+00	7.25E-02	3.13E-04	1.90E-02	9.19E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.05E+01	2.54E-02	0.00E+00	4.40E+01	0.00E+00	4.40E+01	3.40E-03	8.92E-02	4.41E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.74E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	2.56E-04	5.73E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.55E-01	--	1.55E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	5.51E-05	--	5.51E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.36E-04	--	2.36E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	7.75E-05	--	7.75E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	7.41E-05	--	7.41E-05				
Total LMW PAHs						0.00E+00	4.43E-04	0.00E+00	4.43E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.96E-01	5.75E-04	0.00E+00	4.17E-02	0.00E+00	4.17E-02	7.71E-05	2.89E-04	4.21E-02				
Benzo(A)Pyrene	3.08E-01	1.94E-03	0.00E+00	5.48E-02	0.00E+00	5.48E-02	2.60E-04	4.53E-04	5.55E-02				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	6.82E-04	--	6.82E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	9.79E-05	--	9.79E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.94E-04	--	4.94E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	8.98E-06	--	8.98E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.39E-05	--	4.39E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.78E-04	--	1.78E-04				
Total HMW PAHs						9.65E-02	1.86E-03	7.42E-04	9.91E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	6.25E-02	5.25E-03	0.00E+00	4.56E-01	0.00E+00	4.56E-01	7.04E-04	9.22E-05	4.57E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H17-11
Refined Exposure Evaluation - Short-tailed Shrew
Eastern Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	6.26E+00	3.75E-02	2.35E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.82E-01	Sample et al. (1999)	Regression ^f	3.53E-02	Sample et al. (1998b)
Barium	NA	2.95E+02	1.56E-01	4.61E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.69E+01	Sample et al. (1998a)	6.83E-04	2.02E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	3.90E-01	Regression ^a	3.72E-01	Bechtel-Jacobs (1998a)	Regression ^d	3.92E+00	Sample et al. (1999)	Regression ^f	1.82E-01	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	5.83E+00	7.50E-03	4.37E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	7.11E-01	Sample et al. (1998a)	Regression ^f	1.15E-01	Sample et al. (1998b)
Copper	NA	1.35E+01	Regression ^a	5.44E+00	Bechtel-Jacobs (1998a)	5.15E-01	6.96E+00	Sample et al. (1998a)	Regression ^f	1.12E+01	Sample et al. (1998b)
Lead	NA	1.29E+01	Regression ^a	1.11E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.33E+00	Sample et al. (1999)	Regression ^f	3.34E+00	Sample et al. (1998b)
Manganese	NA	1.14E+03	7.90E-02	9.01E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	5.41E+01	Sample et al. (1999)	2.05E-02	2.34E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	1.90E-01	4.00E-03	7.60E-04	Baes et al. (1984)	5.41E-02	1.03E-02	USCHPPM (2004)	1.08E-01	2.06E-02	Baes et al. (1984) ^e
Vanadium	NA	1.34E+01	4.85E-03	6.52E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.64E-01	Sample et al. (1998a)	1.23E-02	1.65E-01	Sample et al. (1998b) ⁱ
Zinc	NA	6.77E+01	Regression ^a	4.99E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.41E+02	Sample et al. (1998a)	Regression ^f	1.06E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.58E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H18-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	1.21E-01	2.38E-02	2.87E-03	USEPA (2007a)	5.44E+01	6.56E+00	USEPA (2007a)	7.79E-01	9.40E-02	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H18-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H18-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H18-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	6.86E+00	3.75E-02	2.57E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	9.40E-01	Sample et al. (1999)	Regression ^f	3.80E-02	Sample et al. (1998b)
Barium	NA	2.19E+02	1.56E-01	3.41E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.99E+01	Sample et al. (1998a)	6.83E-04	1.49E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	2.14E-01	Regression ^a	2.68E-01	Bechtel-Jacobs (1998a)	Regression ^d	2.43E+00	Sample et al. (1999)	Regression ^f	1.37E-01	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	5.91E+00	7.50E-03	4.43E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	7.21E-01	Sample et al. (1998a)	Regression ^f	1.17E-01	Sample et al. (1998b)
Copper	NA	1.47E+01	Regression ^a	5.62E+00	Bechtel-Jacobs (1998a)	5.15E-01	7.57E+00	Sample et al. (1998a)	Regression ^f	1.14E+01	Sample et al. (1998b)
Lead	NA	1.22E+01	Regression ^a	1.08E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.06E+00	Sample et al. (1999)	Regression ^f	3.26E+00	Sample et al. (1998b)
Manganese	NA	5.81E+02	7.90E-02	4.59E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	3.42E+01	Sample et al. (1999)	2.05E-02	1.19E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	1.13E-01	4.00E-03	4.50E-04	Baes et al. (1984)	5.41E-02	6.09E-03	USCHPPM (2004)	1.08E-01	1.22E-02	Baes et al. (1984) ^e
Vanadium	NA	1.22E+01	4.85E-03	5.94E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.14E-01	Sample et al. (1998a)	1.23E-02	1.51E-01	Sample et al. (1998b) ⁱ
Zinc	NA	5.65E+01	Regression ^a	4.52E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.21E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	1.03E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											

Table H18-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	1.62E-01	2.38E-02	3.84E-03	USEPA (2007a)	5.44E+01	8.79E+00	USEPA (2007a)	7.79E-01	1.26E-01	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H18-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H18-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North-Central Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([die_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H18-2
Refined Exposure Evaluation - American Woodcock
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.09E-04	--	1.09E-04	No TRV	--	No TRV	--
Arsenic	6.26E+00	9.37E-04	2.76E-03	9.33E-02	0.00E+00	9.60E-02	1.10E-04	5.52E-02	1.51E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	1.73E-01	5.42E-01	2.84E+00	0.00E+00	3.38E+00	2.03E-02	2.60E+00	6.01E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.07E-05	--	3.07E-05	No TRV	--	No TRV	--
Cadmium	3.90E-01	6.80E-04	4.37E-03	4.14E-01	0.00E+00	4.19E-01	7.99E-05	3.44E-03	4.22E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.49E-04	--	3.49E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.83E+00	1.78E-03	5.13E-04	7.52E-02	0.00E+00	7.57E-02	2.09E-04	5.13E-02	1.27E-01	7.61E+00	<1	2.02E+01	<1
Copper	1.35E+01	9.09E-03	6.39E-02	7.36E-01	0.00E+00	8.00E-01	1.07E-03	1.19E-01	9.21E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.29E+01	1.75E-03	1.31E-02	6.69E-01	0.00E+00	6.82E-01	2.06E-04	1.14E-01	7.96E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.14E+03	1.34E-01	1.06E+00	5.72E+00	0.00E+00	6.78E+00	1.58E-02	1.00E+01	1.68E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.72E-05	--	1.72E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-04	0.00E+00	4.65E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.49E-05	0.00E+00	8.49E-05	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	2.54E-04	8.93E-06	1.09E-03	0.00E+00	1.10E-03	2.98E-05	1.67E-03	2.80E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.34E+01	2.33E-03	7.65E-04	5.97E-02	0.00E+00	6.04E-02	2.74E-04	1.18E-01	1.79E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.77E+01	2.54E-02	5.86E-01	3.60E+01	0.00E+00	3.66E+01	2.98E-03	5.97E-01	3.72E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.58E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	1.40E-03	6.19E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.36E-01	--	1.36E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.83E-05	--	4.83E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.07E-04	--	2.07E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	6.79E-05	--	6.79E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.50E-05	--	6.50E-05				
Total LMW PAHs						0.00E+00	3.88E-04	0.00E+00	3.88E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	6.76E-05	--	6.76E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.98E-04	--	5.98E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.58E-05	--	8.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.33E-04	--	4.33E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.87E-06	--	7.87E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.85E-05	--	3.85E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.56E-04	--	1.56E-04				
Total HMW PAHs						0.00E+00	1.63E-03	0.00E+00	1.63E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.21E-01	5.25E-03	3.37E-05	6.94E-01	0.00E+00	6.94E-01	6.17E-04	1.06E-03	6.96E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H18-2
Refined Exposure Evaluation - American Woodcock
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-3
Refined Exposure Evaluation - Mourning Dove
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.06E-04	--	1.06E-04	No TRV	--	No TRV	--
Arsenic	6.26E+00	9.37E-04	2.68E-02	0.00E+00	0.00E+00	2.68E-02	1.07E-04	4.86E-02	7.56E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	1.73E-01	5.26E+00	0.00E+00	0.00E+00	5.26E+00	1.97E-02	2.29E+00	7.57E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.98E-05	--	2.98E-05	No TRV	--	No TRV	--
Cadmium	3.90E-01	6.80E-04	4.24E-02	0.00E+00	0.00E+00	4.24E-02	7.76E-05	3.03E-03	4.56E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.39E-04	--	3.39E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.83E+00	1.78E-03	4.99E-03	0.00E+00	0.00E+00	4.99E-03	2.03E-04	4.52E-02	5.04E-02	7.61E+00	<1	2.02E+01	<1
Copper	1.35E+01	9.09E-03	6.21E-01	0.00E+00	0.00E+00	6.21E-01	1.04E-03	1.05E-01	7.27E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.29E+01	1.75E-03	1.27E-01	0.00E+00	0.00E+00	1.27E-01	2.00E-04	1.00E-01	2.27E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.14E+03	1.34E-01	1.03E+01	0.00E+00	0.00E+00	1.03E+01	1.53E-02	8.85E+00	1.91E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.67E-05	--	1.67E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.52E-04	0.00E+00	4.52E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.25E-05	0.00E+00	8.25E-05	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	2.54E-04	8.67E-05	0.00E+00	0.00E+00	8.67E-05	2.90E-05	1.47E-03	1.59E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.34E+01	2.33E-03	7.44E-03	0.00E+00	0.00E+00	7.44E-03	2.66E-04	1.04E-01	1.12E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.77E+01	2.54E-02	5.70E+00	0.00E+00	0.00E+00	5.70E+00	2.89E-03	5.26E-01	6.23E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.58E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	1.23E-03	5.89E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.32E-01	--	1.32E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.70E-05	--	4.70E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	6.60E-05	--	6.60E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.31E-05	--	6.31E-05				
Total LMW PAHs						0.00E+00	3.77E-04	0.00E+00	3.77E-04	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	6.56E-05	--	6.56E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.21E-04	--	2.21E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.81E-04	--	5.81E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.34E-05	--	8.34E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.21E-04	--	4.21E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.65E-06	--	7.65E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.74E-05	--	3.74E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.52E-04	--	1.52E-04				
Total HMW PAHs						0.00E+00	1.59E-03	0.00E+00	1.59E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.21E-01	5.25E-03	3.28E-04	0.00E+00	0.00E+00	3.28E-04	5.99E-04	9.36E-04	1.86E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H18-3
Refined Exposure Evaluation - Mourning Dove
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-4
Refined Exposure Evaluation - Red-tailed Hawk
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	7.61E-05	--	7.61E-05	No TRV	--	No TRV	--
Arsenic	6.26E+00	9.37E-04	0.00E+00	0.00E+00	2.89E-03	2.89E-03	7.68E-05	1.34E-02	1.63E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	1.73E-01	0.00E+00	0.00E+00	1.65E-02	1.65E-02	1.42E-02	6.30E-01	6.61E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.14E-05	--	2.14E-05	No TRV	--	No TRV	--
Cadmium	3.90E-01	6.80E-04	0.00E+00	0.00E+00	1.50E-02	1.50E-02	5.58E-05	8.32E-04	1.58E-02	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	2.44E-04	--	2.44E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.83E+00	1.78E-03	0.00E+00	0.00E+00	9.42E-03	9.42E-03	1.46E-04	1.24E-02	2.20E-02	7.61E+00	<1	2.02E+01	<1
Copper	1.35E+01	9.09E-03	0.00E+00	0.00E+00	9.21E-01	9.21E-01	7.45E-04	2.88E-02	9.50E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.29E+01	1.75E-03	0.00E+00	0.00E+00	2.74E-01	2.74E-01	1.44E-04	2.75E-02	3.02E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.14E+03	1.34E-01	0.00E+00	0.00E+00	1.92E+00	1.92E+00	1.10E-02	2.43E+00	4.36E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.20E-05	--	1.20E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-04	0.00E+00	3.25E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-05	0.00E+00	5.93E-05	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	2.54E-04	0.00E+00	0.00E+00	1.69E-03	1.69E-03	2.08E-05	4.05E-04	2.11E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.34E+01	2.33E-03	0.00E+00	0.00E+00	1.36E-02	1.36E-02	1.91E-04	2.86E-02	4.24E-02	3.44E-01	<1	1.70E+00	<1
Zinc	6.77E+01	2.54E-02	0.00E+00	0.00E+00	8.67E+00	8.67E+00	2.08E-03	1.44E-01	8.82E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.58E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	3.38E-04	3.69E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	9.49E-02	--	9.49E-02	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	3.37E-05	--	3.37E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	1.44E-04	--	1.44E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	4.74E-05	--	4.74E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	4.54E-05	--	4.54E-05				
Total LMW PAHs						0.00E+00	2.71E-04	0.00E+00	2.71E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	4.72E-05	--	4.72E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	4.17E-04	--	4.17E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	5.99E-05	--	5.99E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	3.02E-04	--	3.02E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	5.49E-06	--	5.49E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	2.69E-05	--	2.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.09E-04	--	1.09E-04				
Total HMW PAHs						0.00E+00	1.14E-03	0.00E+00	1.14E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.21E-01	5.25E-03	0.00E+00	0.00E+00	7.71E-03	7.71E-03	4.31E-04	2.57E-04	8.39E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H18-4
Refined Exposure Evaluation - Red-tailed Hawk
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.47E-04	--	1.47E-04	No TRV	--	No TRV	--
Arsenic	6.26E+00	9.37E-04	0.00E+00	1.40E-01	0.00E+00	1.40E-01	1.48E-04	0.00E+00	1.40E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.95E+02	1.73E-01	0.00E+00	4.26E+00	0.00E+00	4.26E+00	2.74E-02	0.00E+00	4.28E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	4.13E-05	--	4.13E-05	No TRV	--	No TRV	--
Cadmium	3.90E-01	6.80E-04	0.00E+00	6.20E-01	0.00E+00	6.20E-01	1.08E-04	0.00E+00	6.20E-01	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.71E-04	--	4.71E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	5.83E+00	1.78E-03	0.00E+00	1.13E-01	0.00E+00	1.13E-01	2.82E-04	0.00E+00	1.13E-01	7.61E+00	<1	2.02E+01	<1
Copper	1.35E+01	9.09E-03	0.00E+00	1.10E+00	0.00E+00	1.10E+00	1.44E-03	0.00E+00	1.10E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.29E+01	1.75E-03	0.00E+00	1.00E+00	0.00E+00	1.00E+00	2.77E-04	0.00E+00	1.00E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.14E+03	1.34E-01	0.00E+00	8.57E+00	0.00E+00	8.57E+00	2.13E-02	0.00E+00	8.59E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.31E-05	--	2.31E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.27E-04	0.00E+00	6.27E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-04	0.00E+00	1.14E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.90E-01	2.54E-04	0.00E+00	1.63E-03	0.00E+00	1.63E-03	4.02E-05	0.00E+00	1.67E-03	3.50E-01	<1	3.50E+00	<1
Vanadium	1.34E+01	2.33E-03	0.00E+00	8.93E-02	0.00E+00	8.93E-02	3.70E-04	0.00E+00	8.97E-02	3.44E-01	<1	1.70E+00	<1
Zinc	6.77E+01	2.54E-02	0.00E+00	5.40E+01	0.00E+00	5.40E+01	4.01E-03	0.00E+00	5.40E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.58E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.83E-01	--	1.83E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.52E-05	--	6.52E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	9.15E-05	--	9.15E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.76E-05	--	8.76E-05				
Total LMW PAHs						0.00E+00	5.23E-04	0.00E+00	5.23E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	9.11E-05	--	9.11E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	3.07E-04	--	3.07E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	8.06E-04	--	8.06E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.16E-04	--	1.16E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.84E-04	--	5.84E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.06E-05	--	1.06E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	5.19E-05	--	5.19E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.11E-04	--	2.11E-04				
Total HMW PAHs						0.00E+00	2.20E-03	0.00E+00	2.20E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.21E-01	5.25E-03	0.00E+00	1.04E+00	0.00E+00	1.04E+00	8.31E-04	0.00E+00	1.04E+00	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H18-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-6
Refined Exposure Evaluation - Canada Lynx
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	2.90E-05	--	2.90E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.26E+00	9.37E-04	0.00E+00	0.00E+00	1.10E-03	1.10E-03	2.93E-05	5.48E-03	6.61E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	1.73E-01	0.00E+00	0.00E+00	6.30E-03	6.30E-03	5.40E-03	2.59E-01	2.70E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	8.15E-06	--	8.15E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	3.90E-01	6.80E-04	0.00E+00	0.00E+00	5.70E-03	5.70E-03	2.12E-05	3.41E-04	6.06E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	9.29E-05	--	9.29E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	5.83E+00	1.78E-03	0.00E+00	0.00E+00	3.59E-03	3.59E-03	5.56E-05	5.10E-03	8.74E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.35E+01	9.09E-03	0.00E+00	0.00E+00	3.51E-01	3.51E-01	2.84E-04	1.18E-02	3.63E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.29E+01	1.75E-03	0.00E+00	0.00E+00	1.04E-01	1.04E-01	5.47E-05	1.13E-02	1.16E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.14E+03	1.34E-01	0.00E+00	0.00E+00	7.30E-01	7.30E-01	4.20E-03	9.97E-01	1.73E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.56E-06	--	4.56E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04	0.00E+00	1.24E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-05	0.00E+00	2.26E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.90E-01	2.54E-04	0.00E+00	0.00E+00	6.42E-04	6.42E-04	7.94E-06	1.66E-04	8.16E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.34E+01	2.33E-03	0.00E+00	0.00E+00	5.16E-03	5.16E-03	7.29E-05	1.18E-02	1.70E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.77E+01	2.54E-02	0.00E+00	0.00E+00	3.30E+00	3.30E+00	7.92E-04	5.93E-02	3.36E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.58E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	1.39E-04	1.41E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.62E-02	--	3.62E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.29E-05	--	1.29E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.50E-05	--	5.50E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	1.81E-05	--	1.81E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Total LMW PAHs						0.00E+00	1.03E-04	0.00E+00	1.03E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	6.06E-05	--	6.06E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.28E-05	--	2.28E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.15E-04	--	1.15E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.09E-06	--	2.09E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.02E-05	--	1.02E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.16E-05	--	4.16E-05				
Total HMW PAHs						0.00E+00	4.34E-04	0.00E+00	4.34E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.21E-01	5.25E-03	0.00E+00	0.00E+00	2.94E-03	2.94E-03	1.64E-04	1.06E-04	3.21E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H18-6
Refined Exposure Evaluation - Canada Lynx
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-7
Refined Exposure Evaluation - Grizzly Bear
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	0.00E+00	2.00E-05	--	2.00E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.26E+00	9.37E-04	3.30E-03	2.86E-03	7.62E-05	0.00E+00	6.23E-03	2.02E-05	3.79E-03	1.00E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.95E+02	1.73E-01	6.47E-01	8.71E-02	4.36E-04	0.00E+00	7.35E-01	3.73E-03	1.79E-01	9.17E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	0.00E+00	5.64E-06	--	5.64E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	3.90E-01	6.80E-04	5.22E-03	1.27E-02	3.94E-04	0.00E+00	1.83E-02	1.47E-05	2.36E-04	1.86E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	0.00E+00	6.42E-05	--	6.42E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	5.83E+00	1.78E-03	6.13E-04	2.30E-03	2.48E-04	0.00E+00	3.16E-03	3.84E-05	3.52E-03	6.73E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.35E+01	9.09E-03	7.64E-02	2.26E-02	2.42E-02	0.00E+00	1.23E-01	1.96E-04	8.18E-03	1.32E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.29E+01	1.75E-03	1.56E-02	2.05E-02	7.22E-03	0.00E+00	4.33E-02	3.78E-05	7.80E-03	5.12E-02	4.70E+00	<1	1.86E+02	<1
Manganese	1.14E+03	1.34E-01	1.26E+00	1.75E-01	5.05E-02	0.00E+00	1.49E+00	2.90E-03	6.89E-01	2.18E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	0.00E+00	3.15E-06	--	3.15E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.55E-05	0.00E+00	8.55E-05	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-05	0.00E+00	1.56E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.90E-01	2.54E-04	1.07E-05	3.33E-05	4.44E-05	0.00E+00	8.84E-05	5.49E-06	1.15E-04	2.09E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.34E+01	2.33E-03	9.15E-04	1.83E-03	3.57E-04	0.00E+00	3.10E-03	5.04E-05	8.12E-03	1.13E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.77E+01	2.54E-02	7.01E-01	1.10E+00	2.28E-01	0.00E+00	2.03E+00	5.48E-04	4.10E-02	2.07E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	1.58E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	9.58E-05	9.77E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	0.00E+00	2.50E-02	--	2.50E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	0.00E+00	8.89E-06	--	8.89E-06				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	0.00E+00	3.80E-05	--	3.80E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	0.00E+00	1.25E-05	--	1.25E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	0.00E+00	1.19E-05	--	1.19E-05				
Total LMW PAHs							0.00E+00	7.13E-05	0.00E+00	7.13E-05	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	0.00E+00	1.24E-05	--	1.24E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	0.00E+00	4.19E-05	--	4.19E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	0.00E+00	1.58E-05	--	1.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	0.00E+00	7.96E-05	--	7.96E-05				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	0.00E+00	1.45E-06	--	1.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	0.00E+00	7.08E-06	--	7.08E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	0.00E+00	2.87E-05	--	2.87E-05				
Total HMW PAHs							0.00E+00	3.00E-04	0.00E+00	3.00E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.21E-01	5.25E-03	4.03E-05	2.13E-02	2.03E-04	0.00E+00	2.15E-02	1.13E-04	7.29E-05	2.17E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H18-7
Refined Exposure Evaluation - Grizzly Bear
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-8
Refined Exposure Evaluation - Long-tailed Weasel
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	4.78E-05	--	4.78E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.86E+00	9.37E-04	0.00E+00	0.00E+00	1.95E-03	1.95E-03	4.82E-05	5.65E-03	7.65E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.19E+02	1.73E-01	0.00E+00	0.00E+00	7.69E-03	7.69E-03	8.90E-03	1.80E-01	1.97E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	6.80E-04	0.00E+00	0.00E+00	7.06E-03	7.06E-03	3.50E-05	1.76E-04	7.27E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	5.91E+00	1.78E-03	0.00E+00	0.00E+00	6.02E-03	6.02E-03	9.15E-05	4.86E-03	1.10E-02	7.33E+00	<1	1.89E+01	<1
Copper	1.47E+01	9.09E-03	0.00E+00	0.00E+00	5.85E-01	5.85E-01	4.68E-04	1.21E-02	5.97E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	1.75E-03	0.00E+00	0.00E+00	1.68E-01	1.68E-01	9.01E-05	1.01E-02	1.78E-01	4.70E+00	<1	1.86E+02	<1
Manganese	5.81E+02	1.34E-01	0.00E+00	0.00E+00	6.13E-01	6.13E-01	6.92E-03	4.78E-01	1.10E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	7.51E-06	--	7.51E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-04	0.00E+00	2.04E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-05	0.00E+00	3.72E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	2.54E-04	0.00E+00	0.00E+00	6.26E-04	6.26E-04	1.31E-05	9.26E-05	7.32E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.22E+01	2.33E-03	0.00E+00	0.00E+00	7.75E-03	7.75E-03	1.20E-04	1.01E-02	1.80E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	0.00E+00	0.00E+00	5.37E+00	5.37E+00	1.30E-03	4.65E-02	5.42E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.03E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	8.49E-05	2.19E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	5.96E-02	--	5.96E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	2.12E-05	--	2.12E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	9.06E-05	--	9.06E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	2.85E-05	--	2.85E-05				
Total LMW PAHs						0.00E+00	1.70E-04	0.00E+00	1.70E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	2.96E-05	--	2.96E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	9.97E-05	--	9.97E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	2.62E-04	--	2.62E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	3.76E-05	--	3.76E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.90E-04	--	1.90E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	3.45E-06	--	3.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.69E-05	--	1.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	6.84E-05	--	6.84E-05				
Total HMW PAHs						0.00E+00	7.15E-04	0.00E+00	7.15E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.62E-01	5.25E-03	0.00E+00	0.00E+00	6.48E-03	6.48E-03	2.70E-04	1.33E-04	6.88E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H18-8
Refined Exposure Evaluation - Long-tailed Weasel
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-9
Refined Exposure Evaluation - Meadow Vole
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.39E-04	--	1.39E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	6.86E+00	9.37E-04	3.87E-02	0.00E+00	0.00E+00	3.87E-02	1.41E-04	1.34E-02	5.22E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.19E+02	1.73E-01	5.13E+00	0.00E+00	0.00E+00	5.13E+00	2.60E-02	4.28E-01	5.58E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.92E-05	--	3.92E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	6.80E-04	4.02E-02	0.00E+00	0.00E+00	4.02E-02	1.02E-04	4.17E-04	4.08E-02	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.47E-04	--	4.47E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	5.91E+00	1.78E-03	6.66E-03	0.00E+00	0.00E+00	6.66E-03	2.67E-04	1.15E-02	1.85E-02	7.33E+00	<1	1.89E+01	<1
Copper	1.47E+01	9.09E-03	8.45E-01	0.00E+00	0.00E+00	8.45E-01	1.37E-03	2.87E-02	8.75E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	1.75E-03	1.62E-01	0.00E+00	0.00E+00	1.62E-01	2.63E-04	2.39E-02	1.86E-01	4.70E+00	<1	1.86E+02	<1
Manganese	5.81E+02	1.34E-01	6.89E+00	0.00E+00	0.00E+00	6.89E+00	2.02E-02	1.13E+00	8.05E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.19E-05	--	2.19E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-04	0.00E+00	5.95E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	0.00E+00	1.09E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	2.54E-04	6.76E-05	0.00E+00	0.00E+00	6.76E-05	3.82E-05	2.20E-04	3.25E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.22E+01	2.33E-03	8.92E-03	0.00E+00	0.00E+00	8.92E-03	3.51E-04	2.39E-02	3.32E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	6.78E+00	0.00E+00	0.00E+00	6.78E+00	3.81E-03	1.10E-01	6.90E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.03E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	2.01E-04	6.33E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.74E-01	--	1.74E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.18E-05	--	6.18E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.64E-04	--	2.64E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	8.69E-05	--	8.69E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Total LMW PAHs						0.00E+00	4.96E-04	0.00E+00	4.96E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	8.64E-05	--	8.64E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	7.65E-04	--	7.65E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.54E-04	--	5.54E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.01E-05	--	1.01E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.92E-05	--	4.92E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.00E-04	--	2.00E-04				
Total HMW PAHs						0.00E+00	2.09E-03	0.00E+00	2.09E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.62E-01	5.25E-03	5.78E-04	0.00E+00	0.00E+00	5.78E-04	7.89E-04	3.16E-04	1.68E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H18-9
Refined Exposure Evaluation - Meadow Vole
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-10
Refined Exposure Evaluation - North American Wolverine
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	2.79E-05	--	2.79E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	6.86E+00	9.37E-04	0.00E+00	0.00E+00	1.14E-03	1.14E-03	2.81E-05	5.77E-03	6.94E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.19E+02	1.73E-01	0.00E+00	0.00E+00	4.49E-03	4.49E-03	5.19E-03	1.84E-01	1.94E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	7.84E-06	--	7.84E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	6.80E-04	0.00E+00	0.00E+00	4.12E-03	4.12E-03	2.04E-05	1.80E-04	4.32E-03	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	8.93E-05	--	8.93E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	5.91E+00	1.78E-03	0.00E+00	0.00E+00	3.52E-03	3.52E-03	5.34E-05	4.97E-03	8.54E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.47E+01	9.09E-03	0.00E+00	0.00E+00	3.41E-01	3.41E-01	2.73E-04	1.24E-02	3.54E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	1.75E-03	0.00E+00	0.00E+00	9.81E-02	9.81E-02	5.26E-05	1.03E-02	1.08E-01	4.70E+00	<1	1.86E+02	<1
Manganese	5.81E+02	1.34E-01	0.00E+00	0.00E+00	3.58E-01	3.58E-01	4.04E-03	4.89E-01	8.51E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.39E-06	--	4.39E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-04	0.00E+00	1.19E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-05	0.00E+00	2.17E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	2.54E-04	0.00E+00	0.00E+00	3.66E-04	3.66E-04	7.63E-06	9.46E-05	4.68E-04	4.80E-01	<1	1.43E+00	<1
Vanadium	1.22E+01	2.33E-03	0.00E+00	0.00E+00	4.52E-03	4.52E-03	7.02E-05	1.03E-02	1.49E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	0.00E+00	0.00E+00	3.14E+00	3.14E+00	7.62E-04	4.76E-02	3.18E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.03E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	8.67E-05	1.31E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.48E-02	--	3.48E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.24E-05	--	1.24E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.29E-05	--	5.29E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	1.74E-05	--	1.74E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.66E-05	--	1.66E-05				
Total LMW PAHs						0.00E+00	9.92E-05	0.00E+00	9.92E-05	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	5.82E-05	--	5.82E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.20E-05	--	2.20E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.11E-04	--	1.11E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.01E-06	--	2.01E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	9.85E-06	--	9.85E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.00E-05	--	4.00E-05				
Total HMW PAHs						0.00E+00	4.18E-04	0.00E+00	4.18E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.62E-01	5.25E-03	0.00E+00	0.00E+00	3.78E-03	3.78E-03	1.58E-04	1.36E-04	4.08E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H18-10
Refined Exposure Evaluation - North American Wolverine
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H18-11
Refined Exposure Evaluation - Short-tailed Shrew
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.24E-04	--	1.24E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	6.86E+00	9.37E-04	0.00E+00	1.26E-01	0.00E+00	1.26E-01	1.26E-04	1.01E-02	1.36E-01	1.04E+00	<1	4.55E+00	<1
Barium	2.19E+02	1.73E-01	0.00E+00	2.67E+00	0.00E+00	2.67E+00	2.32E-02	3.23E-01	3.02E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.50E-05	--	3.50E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	2.14E-01	6.80E-04	0.00E+00	3.25E-01	0.00E+00	3.25E-01	9.11E-05	3.15E-04	3.26E-01	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.99E-04	--	3.99E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	5.91E+00	1.78E-03	0.00E+00	9.66E-02	0.00E+00	9.66E-02	2.38E-04	8.71E-03	1.06E-01	7.33E+00	<1	1.89E+01	<1
Copper	1.47E+01	9.09E-03	0.00E+00	1.01E+00	0.00E+00	1.01E+00	1.22E-03	2.17E-02	1.04E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.22E+01	1.75E-03	0.00E+00	8.13E-01	0.00E+00	8.13E-01	2.35E-04	1.80E-02	8.31E-01	4.70E+00	<1	1.86E+02	<1
Manganese	5.81E+02	1.34E-01	0.00E+00	4.58E+00	0.00E+00	4.58E+00	1.80E-02	8.56E-01	5.45E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.96E-05	--	1.96E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E-04	0.00E+00	5.31E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	0.00E+00	9.69E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.13E-01	2.54E-04	0.00E+00	8.16E-04	0.00E+00	8.16E-04	3.40E-05	1.66E-04	1.02E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.22E+01	2.33E-03	0.00E+00	6.89E-02	0.00E+00	6.89E-02	3.13E-04	1.80E-02	8.73E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.65E+01	2.54E-02	0.00E+00	4.31E+01	0.00E+00	4.31E+01	3.40E-03	8.33E-02	4.31E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.03E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	1.52E-04	5.62E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.55E-01	--	1.55E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	5.51E-05	--	5.51E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.36E-04	--	2.36E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	7.75E-05	--	7.75E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	7.41E-05	--	7.41E-05				
Total LMW PAHs						0.00E+00	4.43E-04	0.00E+00	4.43E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	7.71E-05	--	7.71E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.60E-04	--	2.60E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	6.82E-04	--	6.82E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	9.79E-05	--	9.79E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.94E-04	--	4.94E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	8.98E-06	--	8.98E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.39E-05	--	4.39E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.78E-04	--	1.78E-04				
Total HMW PAHs						0.00E+00	1.86E-03	0.00E+00	1.86E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.62E-01	5.25E-03	0.00E+00	1.18E+00	0.00E+00	1.18E+00	7.04E-04	2.38E-04	1.18E+00	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H18-11
Refined Exposure Evaluation - Short-tailed Shrew
North-Central Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	5.98E+00	3.75E-02	2.24E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.53E-01	Sample et al. (1999)	Regression ^f	3.39E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	3.07E+02	1.56E-01	4.79E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.79E+01	Sample et al. (1998a)	6.83E-04	2.09E-01	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.97E-03	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	1.77E+01	Regression ^a	6.05E+00	Bechtel-Jacobs (1998a)	5.15E-01	9.10E+00	Sample et al. (1998a)	Regression ^f	1.17E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.56E+01	Regression ^a	1.24E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.38E+00	Sample et al. (1999)	Regression ^f	3.64E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	6.26E+02	7.90E-02	4.94E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	3.60E+01	Sample et al. (1999)	2.05E-02	1.28E+01	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	ND	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.96E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	4.46E-01	Regression ^a	2.09E-01	Bechtel-Jacobs (1998a)	Regression ^d	5.14E-01	Sample et al. (1998a)	Regression ^f	4.87E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	1.29E+01	4.85E-03	6.25E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.41E-01	Sample et al. (1998a)	1.23E-02	1.58E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	6.72E+01	Regression ^a	4.97E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.40E+02	Sample et al. (1998a)	Regression ^f	1.06E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	4.35E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												

Table H19-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(a)anthracene	5.7	5.75E-04	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	4.92E-02	2.38E-02	1.17E-03	USEPA (2007a)	5.44E+01	2.68E+00	USEPA (2007a)	7.79E-01	3.84E-02	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	1.84E-06	9.41E-02	1.73E-07	USEPA (2007a) ^b	Regression ^d	5.69E-06	Sample et al. (1998a)	Regression ^h	1.12E-06	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	1.61E-07	5.17E-02	8.33E-09	USEPA (2007a) ^b	Regression ^d	3.20E-07	Sample et al. (1998a)	Regression ^h	7.67E-08	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	1.07E-06	2.82E-02	3.02E-08	USEPA (2007a) ^b	Regression ^d	3.00E-06	Sample et al. (1998a)	Regression ^h	6.15E-07	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	1.11E-06	2.82E-02	3.13E-08	USEPA (2007a) ^b	Regression ^d	3.13E-06	Sample et al. (1998a)	Regression ^h	6.40E-07	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	8.62E-07	2.82E-02	2.43E-08	USEPA (2007a) ^b	Regression ^d	2.32E-06	Sample et al. (1998a)	Regression ^h	4.85E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	4.70E-06	1.55E-02	7.29E-08	USEPA (2007a) ^b	Regression ^d	1.72E-05	Sample et al. (1998a)	Regression ^h	3.13E-06	Sample et al. (1998b)
OCDD	9.50	0.00E+00	2.52E-05	8.45E-03	2.13E-07	USEPA (2007a) ^b	Regression ^d	1.26E-04	Sample et al. (1998a)	Regression ^h	1.98E-05	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H19-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,4,7,8-PeCDF	6.94	0.00E+00	2.80E-07	9.24E-02	2.59E-08	USEPA (2007a) ^b	Regression ^d	6.15E-07	Sample et al. (1998a)	1.25E-01	3.50E-08	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	8.00E-07	3.70E-02	2.96E-08	USEPA (2007a) ^b	Regression ^d	2.13E-06	Sample et al. (1998a)	1.25E-01	1.00E-07	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	7.60E-07	3.70E-02	2.81E-08	USEPA (2007a) ^b	Regression ^d	2.00E-06	Sample et al. (1998a)	1.25E-01	9.51E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	9.20E-07	5.08E-02	4.67E-08	USEPA (2007a) ^b	Regression ^d	2.51E-06	Sample et al. (1998a)	1.25E-01	1.15E-07	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	2.03E-06	2.77E-02	5.62E-08	USEPA (2007a) ^b	Regression ^d	6.39E-06	Sample et al. (1998a)	1.25E-01	2.54E-07	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	2.82E-06	1.52E-02	4.29E-08	USEPA (2007a) ^b	Regression ^d	9.43E-06	Sample et al. (1998a)	1.25E-01	3.53E-07	Sample et al. (1998b) ⁱ

Table H19-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H19-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^g
Antimony	NA	9.28E-04	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^g
Arsenic	NA	9.37E-04	5.94E+00	3.75E-02	2.23E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	8.50E-01	Sample et al. (1999)	Regression ^f	3.38E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	2.60E+02	1.56E-01	4.05E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.36E+01	Sample et al. (1998a)	6.83E-04	1.77E-01	Baes et al. (1984) ^g
Beryllium	NA	2.61E-04	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^g
Cadmium	NA	6.80E-04	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1999)	Regression ^f	0.00E+00	Sample et al. (1998b)
Chromium	NA	2.97E-03	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	1.67E+01	Regression ^a	5.91E+00	Bechtel-Jacobs (1998a)	5.15E-01	8.60E+00	Sample et al. (1998a)	Regression ^f	1.16E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.26E+01	Regression ^a	1.10E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.22E+00	Sample et al. (1999)	Regression ^f	3.31E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	4.29E+02	7.90E-02	3.39E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.78E+01	Sample et al. (1999)	2.05E-02	8.80E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	ND	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.96E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	3.21E-01	Regression ^a	1.45E-01	Bechtel-Jacobs (1998a)	Regression ^d	4.04E-01	Sample et al. (1998a)	Regression ^f	4.30E-01	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^g
Vanadium	NA	2.33E-03	1.27E+01	4.85E-03	6.17E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.34E-01	Sample et al. (1998a)	1.23E-02	1.56E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	5.28E+01	Regression ^a	4.35E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.14E+02	Sample et al. (1998a)	Regression ^f	1.04E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	1.31E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	5.7	5.75E-04	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H19-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo[A]Pyrene	6.11	1.94E-03	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ⁱ
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ⁱ
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ⁱ
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	4.29E-02	2.38E-02	1.02E-03	USEPA (2007a)	5.44E+01	2.34E+00	USEPA (2007a)	7.79E-01	3.34E-02	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ⁱ
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	8.14E-01	0.00E+00	USEPA (2007a)	1.03E+01	0.00E+00	USEPA (2007a)	4.49E-01	0.00E+00	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ⁱ
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ⁱ
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	1.39E-06	9.41E-02	1.31E-07	USEPA (2007a) ^b	Regression ^d	4.09E-06	Sample et al. (1998a)	Regression ^h	8.20E-07	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	8.70E-08	5.17E-02	4.50E-09	USEPA (2007a) ^b	Regression ^d	1.54E-07	Sample et al. (1998a)	Regression ^h	3.90E-08	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	2.90E-07	2.82E-02	8.18E-09	USEPA (2007a) ^b	Regression ^d	6.41E-07	Sample et al. (1998a)	Regression ^h	1.46E-07	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	2.39E-07	2.82E-02	6.74E-09	USEPA (2007a) ^b	Regression ^d	5.10E-07	Sample et al. (1998a)	Regression ^h	1.18E-07	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	1.83E-06	1.55E-02	2.84E-08	USEPA (2007a) ^b	Regression ^d	5.66E-06	Sample et al. (1998a)	Regression ^h	1.11E-06	Sample et al. (1998b)
OCDD	9.50	0.00E+00	1.36E-05	8.45E-03	1.15E-07	USEPA (2007a) ^b	Regression ^d	6.06E-05	Sample et al. (1998a)	Regression ^h	1.01E-05	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	0.00E+00	1.53E-07	9.24E-02	1.41E-08	USEPA (2007a) ^b	Regression ^d	3.01E-07	Sample et al. (1998a)	1.25E-01	1.91E-08	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	2.35E-07	3.70E-02	8.69E-09	USEPA (2007a) ^b	Regression ^d	5.00E-07	Sample et al. (1998a)	1.25E-01	2.94E-08	Sample et al. (1998b) ⁱ

Table H19-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	2.37E-07	3.70E-02	8.76E-09	USEPA (2007a) ^b	Regression ^d	5.05E-07	Sample et al. (1998a)	1.25E-01	2.96E-08	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	2.64E-07	5.08E-02	1.34E-08	USEPA (2007a) ^b	Regression ^d	5.74E-07	Sample et al. (1998a)	1.25E-01	3.30E-08	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	3.45E-07	2.77E-02	9.55E-09	USEPA (2007a) ^b	Regression ^d	7.87E-07	Sample et al. (1998a)	1.25E-01	4.32E-08	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	1.32E-06	1.52E-02	2.01E-08	USEPA (2007a) ^b	Regression ^d	3.84E-06	Sample et al. (1998a)	1.25E-01	1.65E-07	Sample et al. (1998b) ⁱ

Table H19-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Western Undeveloped Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H19-2
Refined Exposure Evaluation - American Woodcock
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	0.00E+00	1.09E-04	No TRV	--	No TRV	--
Arsenic	5.98E+00	9.37E-04	2.64E-03	9.02E-02	0.00E+00	9.29E-02	1.10E-04	5.27E-02	1.46E-01	2.24E+00	<1	4.51E+00	<1
Barium	3.07E+02	1.73E-01	5.62E-01	2.95E+00	0.00E+00	3.51E+00	2.03E-02	2.70E+00	6.24E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E-05	0.00E+00	3.07E-05	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.99E-05	0.00E+00	7.99E-05	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.49E-04	--	3.49E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-04	0.00E+00	2.09E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.77E+01	9.09E-03	7.10E-02	9.62E-01	0.00E+00	1.03E+00	1.07E-03	1.56E-01	1.19E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.56E+01	1.75E-03	1.45E-02	7.80E-01	0.00E+00	7.95E-01	2.06E-04	1.37E-01	9.33E-01	1.63E+00	<1	4.46E+01	<1
Manganese	6.26E+02	1.34E-01	5.81E-01	3.80E+00	0.00E+00	4.38E+00	1.58E-02	5.52E+00	9.91E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.72E-05	--	1.72E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-04	0.00E+00	4.65E-04	6.71E+00	<1	1.86E+01	<1
Selenium	4.46E-01	7.23E-04	2.45E-03	5.43E-02	0.00E+00	5.68E-02	8.49E-05	3.93E-03	6.08E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-05	0.00E+00	2.98E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.29E+01	2.33E-03	7.34E-04	5.72E-02	0.00E+00	5.79E-02	2.74E-04	1.13E-01	1.72E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.72E+01	2.54E-02	5.84E-01	3.60E+01	0.00E+00	3.65E+01	2.98E-03	5.92E-01	3.71E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.35E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	3.84E-03	8.63E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.36E-01	--	1.36E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.83E-05	--	4.83E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.07E-04	--	2.07E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	6.79E-05	--	6.79E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.50E-05	--	6.50E-05				
Total LMW PAHs						0.00E+00	3.88E-04	0.00E+00	3.88E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	6.76E-05	--	6.76E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.98E-04	--	5.98E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.58E-05	--	8.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.33E-04	--	4.33E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.87E-06	--	7.87E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.85E-05	--	3.85E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.56E-04	--	1.56E-04				
Total HMW PAHs						0.00E+00	1.63E-03	0.00E+00	1.63E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.92E-02	5.25E-03	1.38E-05	2.83E-01	0.00E+00	2.83E-01	6.17E-04	4.34E-04	2.84E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H19-2
Refined Exposure Evaluation - American Woodcock
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	2.03E-09	6.02E-07	0.00E+00	6.04E-07	0.00E+00	1.62E-08	6.20E-07				
1,2,3,7,8-PeCDD	1.61E-07	0.00E+00	9.79E-11	3.38E-08	0.00E+00	3.39E-08	0.00E+00	1.42E-09	3.53E-08				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	3.54E-10	3.17E-07	0.00E+00	1.59E-08	0.00E+00	4.71E-10	1.63E-08				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	3.68E-10	3.31E-07	0.00E+00	3.32E-09	0.00E+00	9.78E-11	3.41E-09				
1,2,3,7,8,9-HxCDD	8.62E-07	0.00E+00	2.86E-10	2.46E-07	0.00E+00	2.46E-08	0.00E+00	7.60E-10	2.54E-08				
1,2,3,4,6,7,8-HpCDD	4.70E-06	0.00E+00	8.56E-10	1.82E-06	0.00E+00	1.82E-09	0.00E+00	4.14E-11	1.87E-09				
OCDD	2.52E-05	0.00E+00	2.50E-09	1.33E-05	0.00E+00	1.33E-09	0.00E+00	2.22E-11	1.35E-09				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	3.04E-10	6.50E-08	0.00E+00	6.53E-08	0.00E+00	2.47E-09	6.78E-08				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	3.47E-10	2.25E-07	0.00E+00	2.25E-08	0.00E+00	7.05E-10	2.32E-08				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	3.30E-10	2.12E-07	0.00E+00	2.12E-08	0.00E+00	6.70E-10	2.19E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	5.49E-10	2.65E-07	0.00E+00	2.66E-08	0.00E+00	8.11E-10	2.74E-08				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	6.60E-10	6.76E-07	0.00E+00	6.77E-09	0.00E+00	1.79E-10	6.95E-09				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.82E-06	0.00E+00	5.04E-10	9.97E-07	0.00E+00	9.98E-11	0.00E+00	2.48E-12	1.02E-10				
Total Dioxins/Furans						8.27E-07	0.00E+00	2.39E-08	8.27E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

--, HQ could not be calculated because TRV was not available.

Table H19-3
Refined Exposure Evaluation - Mourning Dove
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	1.06E-04	No TRV	--	No TRV	--
Arsenic	5.98E+00	9.37E-04	2.56E-02	0.00E+00	0.00E+00	2.56E-02	1.07E-04	4.64E-02	7.21E-02	2.24E+00	<1	4.51E+00	<1
Barium	3.07E+02	1.73E-01	5.46E+00	0.00E+00	0.00E+00	5.46E+00	1.97E-02	2.38E+00	7.86E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-05	0.00E+00	2.98E-05	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.76E-05	0.00E+00	7.76E-05	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.39E-04	--	3.39E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-04	0.00E+00	2.03E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.77E+01	9.09E-03	6.90E-01	0.00E+00	0.00E+00	6.90E-01	1.04E-03	1.37E-01	8.28E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.56E+01	1.75E-03	1.41E-01	0.00E+00	0.00E+00	1.41E-01	2.00E-04	1.21E-01	2.63E-01	1.63E+00	<1	4.46E+01	<1
Manganese	6.26E+02	1.34E-01	5.64E+00	0.00E+00	0.00E+00	5.64E+00	1.53E-02	4.86E+00	1.05E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.67E-05	--	1.67E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.52E-04	0.00E+00	4.52E-04	6.71E+00	<1	1.86E+01	<1
Selenium	4.46E-01	7.23E-04	2.38E-02	0.00E+00	0.00E+00	2.38E-02	8.25E-05	3.46E-03	2.74E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-05	0.00E+00	2.90E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.29E+01	2.33E-03	7.13E-03	0.00E+00	0.00E+00	7.13E-03	2.66E-04	1.00E-01	1.07E-01	3.44E-01	<1	1.70E+00	<1
Zinc	6.72E+01	2.54E-02	5.67E+00	0.00E+00	0.00E+00	5.67E+00	2.89E-03	5.21E-01	6.20E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.35E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	3.38E-03	8.04E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.32E-01	--	1.32E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.70E-05	--	4.70E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	6.60E-05	--	6.60E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.31E-05	--	6.31E-05				
Total LMW PAHs						0.00E+00	3.77E-04	0.00E+00	3.77E-04	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	6.56E-05	--	6.56E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.21E-04	--	2.21E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.81E-04	--	5.81E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.34E-05	--	8.34E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.21E-04	--	4.21E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.65E-06	--	7.65E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.74E-05	--	3.74E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.52E-04	--	1.52E-04				
Total HMW PAHs						0.00E+00	1.59E-03	0.00E+00	1.59E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.92E-02	5.25E-03	1.34E-04	0.00E+00	0.00E+00	1.34E-04	5.99E-04	3.82E-04	1.12E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H19-3
Refined Exposure Evaluation - Mourning Dove
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	1.98E-08	0.00E+00	0.00E+00	1.98E-08	0.00E+00	1.43E-08	3.40E-08				
1,2,3,7,8-PeCDD	1.61E-07	0.00E+00	9.51E-10	0.00E+00	0.00E+00	9.51E-10	0.00E+00	1.25E-09	2.20E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	3.44E-09	0.00E+00	0.00E+00	1.72E-10	0.00E+00	4.15E-10	5.87E-10				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	3.57E-09	0.00E+00	0.00E+00	3.57E-11	0.00E+00	8.62E-11	1.22E-10				
1,2,3,7,8,9-HxCDD	8.62E-07	0.00E+00	2.77E-09	0.00E+00	0.00E+00	2.77E-10	0.00E+00	6.69E-10	9.46E-10				
1,2,3,4,6,7,8-HpCDD	4.70E-06	0.00E+00	8.32E-09	0.00E+00	0.00E+00	8.32E-12	0.00E+00	3.65E-11	4.48E-11				
OCDD	2.52E-05	0.00E+00	2.43E-08	0.00E+00	0.00E+00	2.43E-12	0.00E+00	1.96E-11	2.20E-11				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	2.95E-09	0.00E+00	0.00E+00	2.95E-09	0.00E+00	2.17E-09	5.12E-09				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	3.38E-09	0.00E+00	0.00E+00	3.38E-10	0.00E+00	6.21E-10	9.58E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	3.21E-09	0.00E+00	0.00E+00	3.21E-10	0.00E+00	5.90E-10	9.11E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	5.33E-09	0.00E+00	0.00E+00	5.33E-10	0.00E+00	7.14E-10	1.25E-09				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	6.41E-09	0.00E+00	0.00E+00	6.41E-11	0.00E+00	1.58E-10	2.22E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.82E-06	0.00E+00	4.90E-09	0.00E+00	0.00E+00	4.90E-13	0.00E+00	2.19E-12	2.68E-12				
Total Dioxins/Furans						2.54E-08	0.00E+00	2.10E-08	4.64E-08	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-4
Refined Exposure Evaluation - Red-tailed Hawk
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E-05	0.00E+00	7.61E-05	No TRV	--	No TRV	--
Arsenic	5.98E+00	9.37E-04	0.00E+00	0.00E+00	2.78E-03	2.78E-03	7.68E-05	1.27E-02	1.56E-02	2.24E+00	<1	4.51E+00	<1
Barium	3.07E+02	1.73E-01	0.00E+00	0.00E+00	1.72E-02	1.72E-02	1.42E-02	6.54E-01	6.85E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.14E-05	0.00E+00	2.14E-05	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.58E-05	0.00E+00	5.58E-05	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	2.44E-04	--	2.44E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-04	0.00E+00	1.46E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.77E+01	9.09E-03	0.00E+00	0.00E+00	9.57E-01	9.57E-01	7.45E-04	3.77E-02	9.95E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.56E+01	1.75E-03	0.00E+00	0.00E+00	2.98E-01	2.98E-01	1.44E-04	3.33E-02	3.32E-01	1.63E+00	<1	4.46E+01	<1
Manganese	6.26E+02	1.34E-01	0.00E+00	0.00E+00	1.05E+00	1.05E+00	1.10E-02	1.33E+00	2.40E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.20E-05	--	1.20E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-04	0.00E+00	3.25E-04	6.71E+00	<1	1.86E+01	<1
Selenium	4.46E-01	7.23E-04	0.00E+00	0.00E+00	3.99E-02	3.99E-02	5.93E-05	9.52E-04	4.10E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-05	0.00E+00	2.08E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.29E+01	2.33E-03	0.00E+00	0.00E+00	1.30E-02	1.30E-02	1.91E-04	2.75E-02	4.06E-02	3.44E-01	<1	1.70E+00	<1
Zinc	6.72E+01	2.54E-02	0.00E+00	0.00E+00	8.67E+00	8.67E+00	2.08E-03	1.43E-01	8.81E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.35E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	9.28E-04	4.28E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	9.49E-02	--	9.49E-02	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	3.37E-05	--	3.37E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	1.44E-04	--	1.44E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	4.74E-05	--	4.74E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	4.54E-05	--	4.54E-05				
Total LMW PAHs						0.00E+00	2.71E-04	0.00E+00	2.71E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	4.72E-05	--	4.72E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	4.17E-04	--	4.17E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	5.99E-05	--	5.99E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	3.02E-04	--	3.02E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	5.49E-06	--	5.49E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	2.69E-05	--	2.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.09E-04	--	1.09E-04				
Total HMW PAHs						0.00E+00	1.14E-03	0.00E+00	1.14E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.92E-02	5.25E-03	0.00E+00	0.00E+00	3.15E-03	3.15E-03	4.31E-04	1.05E-04	3.68E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H19-4
Refined Exposure Evaluation - Red-tailed Hawk
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	0.00E+00	0.00E+00	9.15E-08	9.15E-08	0.00E+00	3.92E-09	9.54E-08				
1,2,3,7,8-PeCDD	1.61E-07	0.00E+00	0.00E+00	0.00E+00	6.29E-09	6.29E-09	0.00E+00	3.43E-10	6.63E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	0.00E+00	5.04E-08	2.52E-09	0.00E+00	1.14E-10	2.64E-09				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	0.00E+00	0.00E+00	5.25E-08	5.25E-10	0.00E+00	2.37E-11	5.49E-10				
1,2,3,7,8,9-HxCDD	8.62E-07	0.00E+00	0.00E+00	0.00E+00	3.98E-08	3.98E-09	0.00E+00	1.84E-10	4.16E-09				
1,2,3,4,6,7,8-HpCDD	4.70E-06	0.00E+00	0.00E+00	0.00E+00	2.57E-07	2.57E-10	0.00E+00	1.00E-11	2.67E-10				
OCDD	2.52E-05	0.00E+00	0.00E+00	0.00E+00	1.63E-06	1.63E-10	0.00E+00	5.37E-12	1.68E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	0.00E+00	0.00E+00	2.87E-09	2.87E-09	0.00E+00	5.97E-10	3.47E-09				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	0.00E+00	0.00E+00	8.21E-09	8.21E-10	0.00E+00	1.71E-10	9.91E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	0.00E+00	0.00E+00	7.80E-09	7.80E-10	0.00E+00	1.62E-10	9.42E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	0.00E+00	0.00E+00	9.44E-09	9.44E-10	0.00E+00	1.96E-10	1.14E-09				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	0.00E+00	0.00E+00	2.08E-08	2.08E-10	0.00E+00	4.33E-11	2.52E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.82E-06	0.00E+00	0.00E+00	0.00E+00	2.89E-08	2.89E-12	0.00E+00	6.01E-13	3.49E-12				
Total Dioxins/Furans						1.11E-07	0.00E+00	5.77E-09	1.17E-07	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-04	0.00E+00	1.47E-04	No TRV	--	No TRV	--
Arsenic	5.98E+00	9.37E-04	0.00E+00	1.35E-01	0.00E+00	1.35E-01	1.48E-04	0.00E+00	1.35E-01	2.24E+00	<1	4.51E+00	<1
Barium	3.07E+02	1.73E-01	0.00E+00	4.42E+00	0.00E+00	4.42E+00	2.74E-02	0.00E+00	4.45E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E-05	0.00E+00	4.13E-05	No TRV	--	No TRV	--
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-04	0.00E+00	1.08E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.71E-04	--	4.71E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	0.00E+00	2.82E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.77E+01	9.09E-03	0.00E+00	1.44E+00	0.00E+00	1.44E+00	1.44E-03	0.00E+00	1.44E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.56E+01	1.75E-03	0.00E+00	1.17E+00	0.00E+00	1.17E+00	2.77E-04	0.00E+00	1.17E+00	1.63E+00	<1	4.46E+01	<1
Manganese	6.26E+02	1.34E-01	0.00E+00	5.69E+00	0.00E+00	5.69E+00	2.13E-02	0.00E+00	5.72E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.31E-05	--	2.31E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.27E-04	0.00E+00	6.27E-04	6.71E+00	<1	1.86E+01	<1
Selenium	4.46E-01	7.23E-04	0.00E+00	8.13E-02	0.00E+00	8.13E-02	1.14E-04	0.00E+00	8.14E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-05	0.00E+00	4.02E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	1.29E+01	2.33E-03	0.00E+00	8.56E-02	0.00E+00	8.56E-02	3.70E-04	0.00E+00	8.60E-02	3.44E-01	<1	1.70E+00	<1
Zinc	6.72E+01	2.54E-02	0.00E+00	5.38E+01	0.00E+00	5.38E+01	4.01E-03	0.00E+00	5.38E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.35E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.83E-01	--	1.83E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.52E-05	--	6.52E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	9.15E-05	--	9.15E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.76E-05	--	8.76E-05				
Total LMW PAHs						0.00E+00	5.23E-04	0.00E+00	5.23E-04	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	9.11E-05	--	9.11E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	3.07E-04	--	3.07E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	8.06E-04	--	8.06E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.16E-04	--	1.16E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.84E-04	--	5.84E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.06E-05	--	1.06E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	5.19E-05	--	5.19E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.11E-04	--	2.11E-04				
Total HMW PAHs						0.00E+00	2.20E-03	0.00E+00	2.20E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.92E-02	5.25E-03	0.00E+00	4.24E-01	0.00E+00	4.24E-01	8.31E-04	0.00E+00	4.25E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H19-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	0.00E+00	9.01E-07	0.00E+00	9.01E-07	0.00E+00	0.00E+00	9.01E-07				
1,2,3,7,8-PeCDD	1.61E-07	0.00E+00	0.00E+00	5.06E-08	0.00E+00	5.06E-08	0.00E+00	0.00E+00	5.06E-08				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	4.75E-07	0.00E+00	2.37E-08	0.00E+00	0.00E+00	2.37E-08				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	0.00E+00	4.96E-07	0.00E+00	4.96E-09	0.00E+00	0.00E+00	4.96E-09				
1,2,3,7,8,9-HxCDD	8.62E-07	0.00E+00	0.00E+00	3.68E-07	0.00E+00	3.68E-08	0.00E+00	0.00E+00	3.68E-08				
1,2,3,4,6,7,8-HpCDD	4.70E-06	0.00E+00	0.00E+00	2.73E-06	0.00E+00	2.73E-09	0.00E+00	0.00E+00	2.73E-09				
OCDD	2.52E-05	0.00E+00	0.00E+00	1.99E-05	0.00E+00	1.99E-09	0.00E+00	0.00E+00	1.99E-09				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	0.00E+00	9.74E-08	0.00E+00	9.74E-08	0.00E+00	0.00E+00	9.74E-08				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	0.00E+00	3.37E-07	0.00E+00	3.37E-08	0.00E+00	0.00E+00	3.37E-08				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	0.00E+00	3.17E-07	0.00E+00	3.17E-08	0.00E+00	0.00E+00	3.17E-08				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	0.00E+00	3.97E-07	0.00E+00	3.97E-08	0.00E+00	0.00E+00	3.97E-08				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	0.00E+00	1.01E-06	0.00E+00	1.01E-08	0.00E+00	0.00E+00	1.01E-08				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.82E-06	0.00E+00	0.00E+00	1.49E-06	0.00E+00	1.49E-10	0.00E+00	0.00E+00	1.49E-10				
Total Dioxins/Furans						1.24E-06	0.00E+00	0.00E+00	1.24E-06	1.75E-06	<1	1.75E-05	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-6
Refined Exposure Evaluation - Canada Lynx
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-05	0.00E+00	2.90E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	5.98E+00	9.37E-04	0.00E+00	0.00E+00	1.06E-03	1.06E-03	2.93E-05	5.23E-03	6.32E-03	1.04E+00	<1	4.55E+00	<1
Barium	3.07E+02	1.73E-01	0.00E+00	0.00E+00	6.54E-03	6.54E-03	5.40E-03	2.68E-01	2.80E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.15E-06	0.00E+00	8.15E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-05	0.00E+00	2.12E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	9.29E-05	--	9.29E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.56E-05	0.00E+00	5.56E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.77E+01	9.09E-03	0.00E+00	0.00E+00	3.64E-01	3.64E-01	2.84E-04	1.55E-02	3.80E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.56E+01	1.75E-03	0.00E+00	0.00E+00	1.14E-01	1.14E-01	5.47E-05	1.36E-02	1.27E-01	4.70E+00	<1	1.86E+02	<1
Manganese	6.26E+02	1.34E-01	0.00E+00	0.00E+00	4.01E-01	4.01E-01	4.20E-03	5.48E-01	9.53E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.56E-06	--	4.56E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04	0.00E+00	1.24E-04	1.70E+00	<1	1.48E+01	<1
Selenium	4.46E-01	7.23E-04	0.00E+00	0.00E+00	1.52E-02	1.52E-02	2.26E-05	3.90E-04	1.56E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.94E-06	0.00E+00	7.94E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	1.29E+01	2.33E-03	0.00E+00	0.00E+00	4.95E-03	4.95E-03	7.29E-05	1.13E-02	1.63E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.72E+01	2.54E-02	0.00E+00	0.00E+00	3.30E+00	3.30E+00	7.92E-04	5.88E-02	3.36E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.35E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	3.81E-04	1.66E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.62E-02	--	3.62E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.29E-05	--	1.29E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.50E-05	--	5.50E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	1.81E-05	--	1.81E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Total LMW PAHs						0.00E+00	1.03E-04	0.00E+00	1.03E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	6.06E-05	--	6.06E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.28E-05	--	2.28E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.15E-04	--	1.15E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.09E-06	--	2.09E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.02E-05	--	1.02E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.16E-05	--	4.16E-05				
Total HMW PAHs						0.00E+00	4.34E-04	0.00E+00	4.34E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.92E-02	5.25E-03	0.00E+00	0.00E+00	1.20E-03	1.20E-03	1.64E-04	4.31E-05	1.41E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H19-6
Refined Exposure Evaluation - Canada Lynx
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.84E-06	0.00E+00	0.00E+00	0.00E+00	3.49E-08	3.49E-08	0.00E+00	1.61E-09	3.65E-08				
1,2,3,7,8-PeCDD	1.61E-07	0.00E+00	0.00E+00	0.00E+00	2.40E-09	2.40E-09	0.00E+00	1.41E-10	2.54E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	0.00E+00	0.00E+00	1.92E-08	1.92E-09	0.00E+00	9.36E-11	2.02E-09				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	0.00E+00	0.00E+00	2.00E-08	2.00E-09	0.00E+00	9.71E-11	2.10E-09				
1,2,3,7,8,9-HxCDD	8.62E-07	0.00E+00	0.00E+00	0.00E+00	1.52E-08	1.52E-09	0.00E+00	7.54E-11	1.59E-09				
1,2,3,4,6,7,8-HpCDD	4.70E-06	0.00E+00	0.00E+00	0.00E+00	9.78E-08	9.78E-10	0.00E+00	4.11E-11	1.02E-09				
OCDD	2.52E-05	0.00E+00	0.00E+00	0.00E+00	6.19E-07	1.86E-10	0.00E+00	6.61E-12	1.92E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	0.00E+00	0.00E+00	1.09E-09	3.28E-10	0.00E+00	7.35E-11	4.02E-10				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	0.00E+00	0.00E+00	3.13E-09	3.13E-10	0.00E+00	7.00E-11	3.83E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	0.00E+00	0.00E+00	2.97E-09	2.97E-10	0.00E+00	6.65E-11	3.64E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	0.00E+00	0.00E+00	3.60E-09	3.60E-10	0.00E+00	8.05E-11	4.40E-10				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	0.00E+00	0.00E+00	7.93E-09	7.93E-11	0.00E+00	1.78E-11	9.71E-11				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.82E-06	0.00E+00	0.00E+00	0.00E+00	1.10E-08	3.31E-12	0.00E+00	7.40E-13	4.05E-12				
Total Dioxins/Furans						4.52E-08	0.00E+00	2.37E-09	4.76E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-7
Refined Exposure Evaluation - Grizzly Bear
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-05	0.00E+00	2.00E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	5.98E+00	9.37E-04	3.15E-03	2.76E-03	7.33E-05	0.00E+00	5.99E-03	2.02E-05	3.61E-03	9.62E-03	1.04E+00	<1	4.55E+00	<1
Barium	3.07E+02	1.73E-01	6.72E-01	9.04E-02	4.52E-04	0.00E+00	7.63E-01	3.73E-03	1.85E-01	9.52E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-06	0.00E+00	5.64E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-05	0.00E+00	1.47E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	0.00E+00	6.42E-05	--	6.42E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-05	0.00E+00	3.84E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.77E+01	9.09E-03	8.49E-02	2.95E-02	2.52E-02	0.00E+00	1.40E-01	1.96E-04	1.07E-02	1.50E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.56E+01	1.75E-03	1.74E-02	2.39E-02	7.85E-03	0.00E+00	4.91E-02	3.78E-05	9.43E-03	5.86E-02	4.70E+00	<1	1.86E+02	<1
Manganese	6.26E+02	1.34E-01	6.94E-01	1.17E-01	2.77E-02	0.00E+00	8.38E-01	2.90E-03	3.78E-01	1.22E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	0.00E+00	3.15E-06	--	3.15E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.55E-05	0.00E+00	8.55E-05	1.70E+00	<1	1.48E+01	<1
Selenium	4.46E-01	7.23E-04	2.93E-03	1.66E-03	1.05E-03	0.00E+00	5.64E-03	1.56E-05	2.70E-04	5.93E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.49E-06	0.00E+00	5.49E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	1.29E+01	2.33E-03	8.77E-04	1.75E-03	3.42E-04	0.00E+00	2.97E-03	5.04E-05	7.79E-03	1.08E-02	4.16E+00	<1	9.44E+00	<1
Zinc	6.72E+01	2.54E-02	6.98E-01	1.10E+00	2.28E-01	0.00E+00	2.03E+00	5.48E-04	4.06E-02	2.07E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	4.35E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	2.63E-04	1.14E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	0.00E+00	2.50E-02	--	2.50E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	0.00E+00	8.89E-06	--	8.89E-06				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	0.00E+00	3.80E-05	--	3.80E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	0.00E+00	1.25E-05	--	1.25E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	0.00E+00	1.19E-05	--	1.19E-05				
Total LMW PAHs							0.00E+00	7.13E-05	0.00E+00	7.13E-05	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	0.00E+00	1.24E-05	--	1.24E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	0.00E+00	4.19E-05	--	4.19E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	0.00E+00	1.58E-05	--	1.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	0.00E+00	7.96E-05	--	7.96E-05				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	0.00E+00	1.45E-06	--	1.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	0.00E+00	7.08E-06	--	7.08E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	0.00E+00	2.87E-05	--	2.87E-05				
Total HMW PAHs							0.00E+00	3.00E-04	0.00E+00	3.00E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.92E-02	5.25E-03	1.64E-05	8.68E-03	8.29E-05	0.00E+00	8.78E-03	1.13E-04	2.98E-05	8.92E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H19-7
Refined Exposure Evaluation - Grizzly Bear
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	1.84E-06	0.00E+00	2.43E-09	1.84E-08	2.41E-09	0.00E+00	2.33E-08	0.00E+00	1.11E-09	2.44E-08				
1,2,3,7,8-PeCDD	1.61E-07	0.00E+00	1.17E-10	1.04E-09	1.66E-10	0.00E+00	1.32E-09	0.00E+00	9.74E-11	1.42E-09				
1,2,3,4,7,8-HxCDD	1.07E-06	0.00E+00	4.24E-10	9.72E-09	1.33E-09	0.00E+00	1.15E-09	0.00E+00	6.47E-11	1.21E-09				
1,2,3,6,7,8-HxCDD	1.11E-06	0.00E+00	4.39E-10	1.01E-08	1.38E-09	0.00E+00	1.20E-09	0.00E+00	6.71E-11	1.26E-09				
1,2,3,7,8,9-HxCDD	8.62E-07	0.00E+00	3.41E-10	7.53E-09	1.05E-09	0.00E+00	8.91E-10	0.00E+00	5.21E-11	9.44E-10				
1,2,3,4,6,7,8-HpCDD	4.70E-06	0.00E+00	1.02E-09	5.59E-08	6.76E-09	0.00E+00	6.37E-10	0.00E+00	2.84E-11	6.65E-10				
OCDD	2.52E-05	0.00E+00	2.99E-09	4.07E-07	4.28E-08	0.00E+00	1.36E-10	0.00E+00	4.57E-12	1.40E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	2.80E-07	0.00E+00	3.63E-10	1.99E-09	7.56E-11	0.00E+00	7.29E-10	0.00E+00	5.08E-11	7.80E-10				
1,2,3,4,7,8-HxCDF	8.00E-07	0.00E+00	4.15E-10	6.89E-09	2.16E-10	0.00E+00	7.52E-10	0.00E+00	4.84E-11	8.01E-10				
1,2,3,6,7,8-HxCDF	7.60E-07	0.00E+00	3.94E-10	6.49E-09	2.05E-10	0.00E+00	7.09E-10	0.00E+00	4.60E-11	7.54E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	9.20E-07	0.00E+00	6.56E-10	8.13E-09	2.49E-10	0.00E+00	9.03E-10	0.00E+00	5.56E-11	9.59E-10				
1,2,3,4,6,7,8-HpCDF	2.03E-06	0.00E+00	7.89E-10	2.07E-08	5.48E-10	0.00E+00	2.21E-10	0.00E+00	1.23E-11	2.33E-10				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	2.82E-06	0.00E+00	6.03E-10	3.06E-08	7.62E-10	0.00E+00	9.57E-12	0.00E+00	5.12E-13	1.01E-11				
Total Dioxins/Furans							3.19E-08	0.00E+00	1.64E-09	3.36E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-8
Refined Exposure Evaluation - Long-tailed Weasel
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.78E-05	0.00E+00	4.78E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	5.94E+00	9.37E-04	0.00E+00	0.00E+00	1.74E-03	1.74E-03	4.82E-05	4.89E-03	6.68E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.60E+02	1.73E-01	0.00E+00	0.00E+00	9.13E-03	9.13E-03	8.90E-03	2.14E-01	2.32E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-05	0.00E+00	1.34E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-05	0.00E+00	3.50E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.15E-05	0.00E+00	9.15E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.67E+01	9.09E-03	0.00E+00	0.00E+00	5.95E-01	5.95E-01	4.68E-04	1.37E-02	6.10E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	0.00E+00	0.00E+00	1.70E-01	1.70E-01	9.01E-05	1.04E-02	1.81E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.29E+02	1.34E-01	0.00E+00	0.00E+00	4.53E-01	4.53E-01	6.92E-03	3.54E-01	8.14E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	7.51E-06	--	7.51E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-04	0.00E+00	2.04E-04	1.70E+00	<1	1.48E+01	<1
Selenium	3.21E-01	7.23E-04	0.00E+00	0.00E+00	2.22E-02	2.22E-02	3.72E-05	2.65E-04	2.25E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-05	0.00E+00	1.31E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.27E+01	2.33E-03	0.00E+00	0.00E+00	8.05E-03	8.05E-03	1.20E-04	1.05E-02	1.86E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.28E+01	2.54E-02	0.00E+00	0.00E+00	5.35E+00	5.35E+00	1.30E-03	4.34E-02	5.39E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.31E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	1.08E-04	2.21E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	5.96E-02	--	5.96E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	2.12E-05	--	2.12E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	9.06E-05	--	9.06E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	2.97E-05	--	2.97E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	2.85E-05	--	2.85E-05				
Total LMW PAHs						0.00E+00	1.70E-04	0.00E+00	1.70E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	2.96E-05	--	2.96E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	9.97E-05	--	9.97E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	2.62E-04	--	2.62E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	3.76E-05	--	3.76E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.90E-04	--	1.90E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	3.45E-06	--	3.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.69E-05	--	1.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	6.84E-05	--	6.84E-05				
Total HMW PAHs						0.00E+00	7.15E-04	0.00E+00	7.15E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.29E-02	5.25E-03	0.00E+00	0.00E+00	1.72E-03	1.72E-03	2.70E-04	3.53E-05	2.03E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H19-8
Refined Exposure Evaluation - Long-tailed Weasel
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	0.00E+00	0.00E+00	4.22E-08	4.22E-08	0.00E+00	1.14E-09	4.33E-08				
1,2,3,7,8-PeCDD	8.70E-08	0.00E+00	0.00E+00	0.00E+00	2.01E-09	2.01E-09	0.00E+00	7.16E-11	2.08E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	0.00E+00	0.00E+00	7.53E-09	7.53E-10	0.00E+00	2.39E-11	7.77E-10				
1,2,3,7,8,9-HxCDD	2.39E-07	0.00E+00	0.00E+00	0.00E+00	6.09E-09	6.09E-10	0.00E+00	1.97E-11	6.29E-10				
1,2,3,4,6,7,8-HpCDD	1.83E-06	0.00E+00	0.00E+00	0.00E+00	5.71E-08	5.71E-10	0.00E+00	1.51E-11	5.86E-10				
OCDD	1.36E-05	0.00E+00	0.00E+00	0.00E+00	5.18E-07	1.55E-10	0.00E+00	3.36E-12	1.59E-10				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	0.00E+00	0.00E+00	9.85E-10	2.95E-10	0.00E+00	3.78E-11	3.33E-10				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	0.00E+00	0.00E+00	1.51E-09	1.51E-10	0.00E+00	1.93E-11	1.71E-10				
1,2,3,6,7,8-HxCDF	2.37E-07	0.00E+00	0.00E+00	0.00E+00	1.53E-09	1.53E-10	0.00E+00	1.95E-11	1.72E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	0.00E+00	0.00E+00	1.70E-09	1.70E-10	0.00E+00	2.17E-11	1.92E-10				
1,2,3,4,6,7,8-HpCDF	3.45E-07	0.00E+00	0.00E+00	0.00E+00	2.22E-09	2.22E-11	0.00E+00	2.84E-12	2.51E-11				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.32E-06	0.00E+00	0.00E+00	0.00E+00	8.50E-09	2.55E-12	0.00E+00	3.26E-13	2.88E-12				
Total Dioxins/Furans						4.71E-08	0.00E+00	1.38E-09	4.85E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-9
Refined Exposure Evaluation - Meadow Vole
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-04	0.00E+00	1.39E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	5.94E+00	9.37E-04	3.35E-02	0.00E+00	0.00E+00	3.35E-02	1.41E-04	1.16E-02	4.52E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.60E+02	1.73E-01	6.09E+00	0.00E+00	0.00E+00	6.09E+00	2.60E-02	5.08E-01	6.62E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-05	0.00E+00	3.92E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-04	0.00E+00	1.02E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.47E-04	--	4.47E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-04	0.00E+00	2.67E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.67E+01	9.09E-03	8.88E-01	0.00E+00	0.00E+00	8.88E-01	1.37E-03	3.26E-02	9.22E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	1.65E-01	0.00E+00	0.00E+00	1.65E-01	2.63E-04	2.47E-02	1.90E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.29E+02	1.34E-01	5.10E+00	0.00E+00	0.00E+00	5.10E+00	2.02E-02	8.39E-01	5.96E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.19E-05	--	2.19E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-04	0.00E+00	5.95E-04	1.70E+00	<1	1.48E+01	<1
Selenium	3.21E-01	7.23E-04	2.18E-02	0.00E+00	0.00E+00	2.18E-02	1.09E-04	6.28E-04	2.25E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E-05	0.00E+00	3.82E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.27E+01	2.33E-03	9.26E-03	0.00E+00	0.00E+00	9.26E-03	3.51E-04	2.48E-02	3.44E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.28E+01	2.54E-02	6.53E+00	0.00E+00	0.00E+00	6.53E+00	3.81E-03	1.03E-01	6.64E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.31E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	2.56E-04	6.39E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.74E-01	--	1.74E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.18E-05	--	6.18E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.64E-04	--	2.64E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	8.69E-05	--	8.69E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Total LMW PAHs						0.00E+00	4.96E-04	0.00E+00	4.96E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	8.64E-05	--	8.64E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	7.65E-04	--	7.65E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.54E-04	--	5.54E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.01E-05	--	1.01E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.92E-05	--	4.92E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.00E-04	--	2.00E-04				
Total HMW PAHs						0.00E+00	2.09E-03	0.00E+00	2.09E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.29E-02	5.25E-03	1.53E-04	0.00E+00	0.00E+00	1.53E-04	7.89E-04	8.38E-05	1.03E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H19-9
Refined Exposure Evaluation - Meadow Vole
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	1.96E-08	0.00E+00	0.00E+00	1.96E-08	0.00E+00	2.71E-09	2.24E-08				
1,2,3,7,8-PeCDD	8.70E-08	0.00E+00	6.76E-10	0.00E+00	0.00E+00	6.76E-10	0.00E+00	1.70E-10	8.46E-10				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	1.23E-09	0.00E+00	0.00E+00	1.23E-10	0.00E+00	5.66E-11	1.79E-10				
1,2,3,7,8,9-HxCDD	2.39E-07	0.00E+00	1.01E-09	0.00E+00	0.00E+00	1.01E-10	0.00E+00	4.67E-11	1.48E-10				
1,2,3,4,6,7,8-HpCDD	1.83E-06	0.00E+00	4.26E-09	0.00E+00	0.00E+00	4.26E-11	0.00E+00	3.57E-11	7.84E-11				
OCDD	1.36E-05	0.00E+00	1.73E-08	0.00E+00	0.00E+00	5.18E-12	0.00E+00	7.97E-12	1.31E-11				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	2.12E-09	0.00E+00	0.00E+00	6.37E-10	0.00E+00	8.96E-11	7.26E-10				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	1.31E-09	0.00E+00	0.00E+00	1.31E-10	0.00E+00	4.59E-11	1.76E-10				
1,2,3,6,7,8-HxCDF	2.37E-07	0.00E+00	1.32E-09	0.00E+00	0.00E+00	1.32E-10	0.00E+00	4.63E-11	1.78E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	2.01E-09	0.00E+00	0.00E+00	2.01E-10	0.00E+00	5.16E-11	2.53E-10				
1,2,3,4,6,7,8-HpCDF	3.45E-07	0.00E+00	1.43E-09	0.00E+00	0.00E+00	1.43E-11	0.00E+00	6.74E-12	2.11E-11				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.32E-06	0.00E+00	3.02E-09	0.00E+00	0.00E+00	9.06E-13	0.00E+00	7.73E-13	1.68E-12				
Total Dioxins/Furans						2.17E-08	0.00E+00	3.27E-09	2.50E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-10
Refined Exposure Evaluation - North American Wolverine
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-05	0.00E+00	2.79E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	5.94E+00	9.37E-04	0.00E+00	0.00E+00	1.01E-03	1.01E-03	2.81E-05	5.00E-03	6.04E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.60E+02	1.73E-01	0.00E+00	0.00E+00	5.33E-03	5.33E-03	5.19E-03	2.19E-01	2.29E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E-06	0.00E+00	7.84E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-05	0.00E+00	2.04E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	8.93E-05	--	8.93E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-05	0.00E+00	5.34E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.67E+01	9.09E-03	0.00E+00	0.00E+00	3.48E-01	3.48E-01	2.73E-04	1.40E-02	3.62E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	0.00E+00	0.00E+00	9.95E-02	9.95E-02	5.26E-05	1.06E-02	1.10E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.29E+02	1.34E-01	0.00E+00	0.00E+00	2.65E-01	2.65E-01	4.04E-03	3.61E-01	6.30E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.39E-06	--	4.39E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-04	0.00E+00	1.19E-04	1.70E+00	<1	1.48E+01	<1
Selenium	3.21E-01	7.23E-04	0.00E+00	0.00E+00	1.29E-02	1.29E-02	2.17E-05	2.70E-04	1.32E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-06	0.00E+00	7.63E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	1.27E+01	2.33E-03	0.00E+00	0.00E+00	4.70E-03	4.70E-03	7.02E-05	1.07E-02	1.55E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.28E+01	2.54E-02	0.00E+00	0.00E+00	3.12E+00	3.12E+00	7.62E-04	4.44E-02	3.17E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.31E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.10E-04	1.34E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.48E-02	--	3.48E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.24E-05	--	1.24E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.29E-05	--	5.29E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	1.74E-05	--	1.74E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.66E-05	--	1.66E-05				
Total LMW PAHs						0.00E+00	9.92E-05	0.00E+00	9.92E-05	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	5.82E-05	--	5.82E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.20E-05	--	2.20E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.11E-04	--	1.11E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.01E-06	--	2.01E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	9.85E-06	--	9.85E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.00E-05	--	4.00E-05				
Total HMW PAHs						0.00E+00	4.18E-04	0.00E+00	4.18E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.29E-02	5.25E-03	0.00E+00	0.00E+00	1.00E-03	1.00E-03	1.58E-04	3.61E-05	1.20E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H19-10
Refined Exposure Evaluation - North American Wolverine
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	0.00E+00	0.00E+00	2.46E-08	2.46E-08	0.00E+00	1.17E-09	2.58E-08				
1,2,3,7,8-PeCDD	8.70E-08	0.00E+00	0.00E+00	0.00E+00	1.17E-09	1.17E-09	0.00E+00	7.32E-11	1.24E-09				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	0.00E+00	0.00E+00	4.40E-09	4.40E-10	0.00E+00	2.44E-11	4.64E-10				
1,2,3,7,8,9-HxCDD	2.39E-07	0.00E+00	0.00E+00	0.00E+00	3.56E-09	3.56E-10	0.00E+00	2.01E-11	3.76E-10				
1,2,3,4,6,7,8-HpCDD	1.83E-06	0.00E+00	0.00E+00	0.00E+00	3.33E-08	3.33E-10	0.00E+00	1.54E-11	3.49E-10				
OCDD	1.36E-05	0.00E+00	0.00E+00	0.00E+00	3.02E-07	9.07E-11	0.00E+00	3.43E-12	9.41E-11				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	0.00E+00	0.00E+00	5.75E-10	1.73E-10	0.00E+00	3.86E-11	2.11E-10				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	0.00E+00	0.00E+00	8.83E-10	8.83E-11	0.00E+00	1.98E-11	1.08E-10				
1,2,3,6,7,8-HxCDF	2.37E-07	0.00E+00	0.00E+00	0.00E+00	8.91E-10	8.91E-11	0.00E+00	1.99E-11	1.09E-10				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	0.00E+00	0.00E+00	9.92E-10	9.92E-11	0.00E+00	2.22E-11	1.21E-10				
1,2,3,4,6,7,8-HpCDF	3.45E-07	0.00E+00	0.00E+00	0.00E+00	1.30E-09	1.30E-11	0.00E+00	2.90E-12	1.59E-11				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.32E-06	0.00E+00	0.00E+00	0.00E+00	4.96E-09	1.49E-12	0.00E+00	3.33E-13	1.82E-12				
Total Dioxins/Furans						2.75E-08	0.00E+00	1.41E-09	2.89E-08	5.62E-07	<1	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H19-11
Refined Exposure Evaluation - Short-tailed Shrew
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	9.28E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04	0.00E+00	1.24E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	5.94E+00	9.37E-04	0.00E+00	1.14E-01	0.00E+00	1.14E-01	1.26E-04	8.76E-03	1.23E-01	1.04E+00	<1	4.55E+00	<1
Barium	2.60E+02	1.73E-01	0.00E+00	3.17E+00	0.00E+00	3.17E+00	2.32E-02	3.83E-01	3.58E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	2.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-05	0.00E+00	3.50E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	0.00E+00	6.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.11E-05	0.00E+00	9.11E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.99E-04	--	3.99E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-04	0.00E+00	2.38E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.67E+01	9.09E-03	0.00E+00	1.15E+00	0.00E+00	1.15E+00	1.22E-03	2.46E-02	1.18E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.26E+01	1.75E-03	0.00E+00	8.34E-01	0.00E+00	8.34E-01	2.35E-04	1.86E-02	8.53E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.29E+02	1.34E-01	0.00E+00	3.73E+00	0.00E+00	3.73E+00	1.80E-02	6.33E-01	4.38E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.96E-05	--	1.96E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E-04	0.00E+00	5.31E-04	1.70E+00	<1	1.48E+01	<1
Selenium	3.21E-01	7.23E-04	0.00E+00	5.41E-02	0.00E+00	5.41E-02	9.69E-05	4.74E-04	5.47E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	2.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-05	0.00E+00	3.40E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	1.27E+01	2.33E-03	0.00E+00	7.16E-02	0.00E+00	7.16E-02	3.13E-04	1.87E-02	9.06E-02	4.16E+00	<1	9.44E+00	<1
Zinc	5.28E+01	2.54E-02	0.00E+00	4.21E+01	0.00E+00	4.21E+01	3.40E-03	7.78E-02	4.22E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.31E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	1.93E-04	5.66E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.55E-01	--	1.55E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	5.51E-05	--	5.51E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.36E-04	--	2.36E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	5.78E-04	--	--	--	0.00E+00	7.75E-05	--	7.75E-05				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	7.41E-05	--	7.41E-05				
Total LMW PAHs						0.00E+00	4.43E-04	0.00E+00	4.43E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	7.71E-05	--	7.71E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.60E-04	--	2.60E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	6.82E-04	--	6.82E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	9.79E-05	--	9.79E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.94E-04	--	4.94E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	8.98E-06	--	8.98E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.39E-05	--	4.39E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.78E-04	--	1.78E-04				
Total HMW PAHs						0.00E+00	1.86E-03	0.00E+00	1.86E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.29E-02	5.25E-03	0.00E+00	3.13E-01	0.00E+00	3.13E-01	7.04E-04	6.33E-05	3.14E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H19-11
Refined Exposure Evaluation - Short-tailed Shrew
Western Undeveloped Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	1.39E-06	0.00E+00	0.00E+00	5.48E-07	0.00E+00	5.48E-07	0.00E+00	2.05E-09	5.50E-07				
1,2,3,7,8-PeCDD	8.70E-08	0.00E+00	0.00E+00	2.07E-08	0.00E+00	2.07E-08	0.00E+00	1.28E-10	2.08E-08				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	2.90E-07	0.00E+00	0.00E+00	8.59E-08	0.00E+00	8.59E-09	0.00E+00	4.28E-11	8.63E-09				
1,2,3,7,8,9-HxCDD	2.39E-07	0.00E+00	0.00E+00	6.84E-08	0.00E+00	6.84E-09	0.00E+00	3.52E-11	6.87E-09				
1,2,3,4,6,7,8-HpCDD	1.83E-06	0.00E+00	0.00E+00	7.58E-07	0.00E+00	7.58E-09	0.00E+00	2.70E-11	7.61E-09				
OCDD	1.36E-05	0.00E+00	0.00E+00	8.12E-06	0.00E+00	2.43E-09	0.00E+00	6.01E-12	2.44E-09				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	1.53E-07	0.00E+00	0.00E+00	4.03E-08	0.00E+00	1.21E-08	0.00E+00	6.77E-11	1.22E-08				
1,2,3,4,7,8-HxCDF	2.35E-07	0.00E+00	0.00E+00	6.70E-08	0.00E+00	6.70E-09	0.00E+00	3.46E-11	6.74E-09				
1,2,3,6,7,8-HxCDF	2.37E-07	0.00E+00	0.00E+00	6.77E-08	0.00E+00	6.77E-09	0.00E+00	3.49E-11	6.80E-09				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	2.64E-07	0.00E+00	0.00E+00	7.69E-08	0.00E+00	7.69E-09	0.00E+00	3.89E-11	7.73E-09				
1,2,3,4,6,7,8-HpCDF	3.45E-07	0.00E+00	0.00E+00	1.05E-07	0.00E+00	1.05E-09	0.00E+00	5.09E-12	1.06E-09				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	1.32E-06	0.00E+00	0.00E+00	5.15E-07	0.00E+00	1.55E-10	0.00E+00	5.84E-13	1.55E-10				
Total Dioxins/Furans						6.28E-07	0.00E+00	2.47E-09	6.31E-07	5.62E-07	1.12E+00	3.76E-06	<1

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	4.90E+00	3.75E-02	1.84E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	7.42E-01	Sample et al. (1999)	Regression ^f	2.89E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	1.58E+02	1.56E-01	2.47E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.44E+01	Sample et al. (1998a)	6.83E-04	1.08E-01	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	2.97E-03	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	1.71E+01	Regression ^a	5.97E+00	Bechtel-Jacobs (1998a)	5.15E-01	8.81E+00	Sample et al. (1998a)	Regression ^f	1.16E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	1.01E+01	Regression ^a	9.67E-01	Bechtel-Jacobs (1998a)	Regression ^d	5.18E+00	Sample et al. (1999)	Regression ^f	2.99E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	3.63E+02	7.90E-02	2.86E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.48E+01	Sample et al. (1999)	2.05E-02	7.43E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.96E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	4.70E+01	Regression ^a	4.08E+01	Bechtel-Jacobs (1998a)	Regression ^d	3.02E+02	Sample et al. (1998a)	Regression ^f	1.03E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	8.76E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	8.10E-01	1.22E+01	9.88E+00	USEPA (2007a)	4.40E+00	3.56E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												

Table H20-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(a)anthracene	5.7	5.75E-04	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	0.00E+00	1.40E-02	8.14E-01	1.14E-02	USEPA (2007a)	1.03E+01	1.44E-01	USEPA (2007a)	4.49E-01	6.29E-03	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H20-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H20-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H20-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 -2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals												
Aluminum	NA	1.14E+00	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.28E-04	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	9.37E-04	4.88E+00	3.75E-02	1.83E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	7.39E-01	Sample et al. (1999)	Regression ^f	2.87E-02	Sample et al. (1998b)
Barium	NA	1.73E-01	1.41E+02	1.56E-01	2.20E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	1.29E+01	Sample et al. (1998a)	6.83E-04	9.64E-02	Baes et al. (1984) ^e
Beryllium	NA	2.61E-04	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	6.80E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	2.97E-03	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	1.78E-03	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	9.09E-03	1.59E+01	Regression ^a	5.80E+00	Bechtel-Jacobs (1998a)	5.15E-01	8.19E+00	Sample et al. (1998a)	Regression ^f	1.15E+01	Sample et al. (1998b)
Lead	NA	1.75E-03	9.42E+00	Regression ^a	9.33E-01	Bechtel-Jacobs (1998a)	Regression ^d	4.91E+00	Sample et al. (1999)	Regression ^f	2.91E+00	Sample et al. (1998b)
Manganese	NA	1.34E-01	3.12E+02	7.90E-02	2.47E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	2.24E+01	Sample et al. (1999)	2.05E-02	6.40E+00	Sample et al. (1998b) ⁱ
Mercury	NA	1.46E-04	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.96E-03	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	7.23E-04	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	Regression ^d	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Silver		0.00E+00	ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	2.54E-04	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	2.33E-03	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	2.54E-02	4.30E+01	Regression ^a	3.88E+01	Bechtel-Jacobs (1998a)	Regression ^d	2.94E+02	Sample et al. (1998a)	Regression ^f	1.02E+02	Sample et al. (1998b)
Inorganics - Other Inorganics												
Cyanide	NA	4.08E-02	1.24E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.16E+00	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	0.00E+00	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	3.92	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.12E-04	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	1.76E-03	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	0.00E+00	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	5.78E-04	3.60E-01	1.22E+01	4.39E+00	USEPA (2007a)	4.40E+00	1.58E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	5.53E-04	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs												
High Molecular Weight (HMW) PAHs:												

Table H20-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 -2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Benzo(a)anthracene	5.7	5.75E-04	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.94E-03	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.09E-03	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	7.31E-04	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	1.53E-04	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	3.69E-03	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	6.70E-05	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	3.28E-04	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	1.33E-03	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs												
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	4.57	0.00E+00	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		0.00E+00	ND									
2-Chloronaphthalene	3.81	0.00E+00	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	0.00E+00	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	5.25E-03	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	0.00E+00	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	0.00E+00	2.70E-02	8.14E-01	2.20E-02	USEPA (2007a)	1.03E+01	2.78E-01	USEPA (2007a)	4.49E-01	1.21E-02	LANL (2015)
Di-n-octyl phthalate	8.54	0.00E+00	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	0.00E+00	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	0.00E+00	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	0.00E+00	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	0.00E+00	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	3.59	0.00E+00	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans												
2,3,7,8-TCDD	6.92	0.00E+00	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	0.00E+00	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	0.00E+00	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	0.00E+00	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	0.00E+00	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	0.00E+00	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H20-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 -2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
				Plants			Soil Invertebrates			Small Mammals		
				Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,4,7,8-PeCDF	6.94	0.00E+00	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	0.00E+00	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	0.00E+00	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	0.00E+00	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	0.00E+00	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H20-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Flathead River Riparian Area (0 -2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	0.938	USEPA (2007)
Beryllium	-0.5361	0.7345	USEPA (2007)
Cadmium	-0.475	0.546	Bechtel-Jacobs (1998)
Copper	0.668	0.394	Bechtel-Jacobs (1998)
Lead	-1.328	0.561	Bechtel-Jacobs (1998)
Mercury	-0.996	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	0.748	Bechtel-Jacobs (1998)
Selenium	-0.677	1.104	Bechtel-Jacobs (1998)
Zinc	1.575	0.554	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-0.8556	USEPA (2007)
Acenaphthylene	-1.144	0.791	USEPA (2007)
Anthracene	-0.9887	0.7784	USEPA (2007)
Benzo(a)anthracene	-2.7078	0.5944	USEPA (2007)
Benzo(a)pyrene	-2.0615	0.975	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.1829	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	0.8595	USEPA (2007)
Chrysene	-2.7078	0.5944	USEPA (2007)
Fluorene	-5.562	-0.8556	USEPA (2007)
Phenanthrene	-0.1665	0.6203	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	0.706	Sample et al. (1999)
Cadmium	2.114	0.795	Sample et al. (1999)
Lead	-0.218	0.807	Sample et al. (1999)
Manganese	-0.809	0.682	Sample et al. (1999)
Selenium	-0.075	0.733	Sample et al. (1999)
Zinc	4.449	0.328	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.182	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	0.8188	Sample et al. (1998b)
Cadmium	-1.2571	0.4723	Sample et al. (1998b)
Chromium	-1.4599	0.7338	Sample et al. (1998b)
Cobalt	-4.4669	1.307	Sample et al. (1998b)
Copper	2.042	0.1444	Sample et al. (1998b)
Lead	0.0761	0.4422	Sample et al. (1998b)
Nickel	-0.2462	0.4658	Sample et al. (1998b)
Selenium	-0.4158	0.3764	Sample et al. (1998b)
Zinc	4.3632	0.0706	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.0993	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H20-2
Refined Exposure Evaluation - American Woodcock
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-01	0.00E+00	1.34E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.09E-04	--	1.09E-04	No TRV	--	No TRV	--
Arsenic	4.90E+00	9.37E-04	2.16E-03	7.84E-02	0.00E+00	8.06E-02	1.10E-04	4.32E-02	1.24E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.58E+02	1.73E-01	2.90E-01	1.52E+00	0.00E+00	1.81E+00	2.03E-02	1.39E+00	3.23E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.07E-05	--	3.07E-05	No TRV	--	No TRV	--
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	7.99E-05	--	7.99E-05	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.49E-04	--	3.49E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-04	0.00E+00	2.09E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.71E+01	9.09E-03	7.01E-02	9.31E-01	0.00E+00	1.00E+00	1.07E-03	1.51E-01	1.15E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.01E+01	1.75E-03	1.14E-02	5.48E-01	0.00E+00	5.59E-01	2.06E-04	8.86E-02	6.48E-01	1.63E+00	<1	4.46E+01	<1
Manganese	3.63E+02	1.34E-01	3.37E-01	2.62E+00	0.00E+00	2.96E+00	1.58E-02	3.19E+00	6.17E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.72E-05	--	1.72E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-04	0.00E+00	4.65E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.49E-05	0.00E+00	8.49E-05	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	2.98E-05	--	2.98E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-04	0.00E+00	2.74E-04	3.44E-01	<1	1.70E+00	<1
Zinc	4.70E+01	2.54E-02	4.79E-01	3.20E+01	0.00E+00	3.25E+01	2.98E-03	4.14E-01	3.29E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-03	7.72E-03	1.25E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.36E-01	--	1.36E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.83E-05	--	4.83E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.07E-04	--	2.07E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	8.10E-01	5.78E-04	1.16E-01	3.77E-01	0.00E+00	4.93E-01	6.79E-05	7.14E-03	5.00E-01				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.50E-05	--	6.50E-05				
Total LMW PAHs						4.93E-01	3.88E-04	7.14E-03	5.00E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	6.76E-05	--	6.76E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.28E-04	--	2.28E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.98E-04	--	5.98E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.58E-05	--	8.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.33E-04	--	4.33E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.87E-06	--	7.87E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.85E-05	--	3.85E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.56E-04	--	1.56E-04				
Total HMW PAHs						0.00E+00	1.63E-03	0.00E+00	1.63E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	6.17E-04	--	6.17E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	ND	1.34E-04	1.53E-02	0.00E+00	1.54E-02	--	1.23E-04	1.55E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H20-2
Refined Exposure Evaluation - American Woodcock
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-3
Refined Exposure Evaluation - Mourning Dove
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.06E-04	--	1.06E-04	No TRV	--	No TRV	--
Arsenic	4.90E+00	9.37E-04	2.10E-02	0.00E+00	0.00E+00	2.10E-02	1.07E-04	3.80E-02	5.91E-02	2.24E+00	<1	4.51E+00	<1
Barium	1.58E+02	1.73E-01	2.82E+00	0.00E+00	0.00E+00	2.82E+00	1.97E-02	1.23E+00	4.06E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.98E-05	--	2.98E-05	No TRV	--	No TRV	--
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	7.76E-05	--	7.76E-05	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.39E-04	--	3.39E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.03E-04	0.00E+00	2.03E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.71E+01	9.09E-03	6.81E-01	0.00E+00	0.00E+00	6.81E-01	1.04E-03	1.33E-01	8.15E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.01E+01	1.75E-03	1.10E-01	0.00E+00	0.00E+00	1.10E-01	2.00E-04	7.81E-02	1.89E-01	1.63E+00	<1	4.46E+01	<1
Manganese	3.63E+02	1.34E-01	3.27E+00	0.00E+00	0.00E+00	3.27E+00	1.53E-02	2.81E+00	6.10E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.67E-05	--	1.67E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.52E-04	0.00E+00	4.52E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.25E-05	0.00E+00	8.25E-05	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	2.90E-05	--	2.90E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E-04	0.00E+00	2.66E-04	3.44E-01	<1	1.70E+00	<1
Zinc	4.70E+01	2.54E-02	4.65E+00	0.00E+00	0.00E+00	4.65E+00	2.89E-03	3.65E-01	5.02E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.66E-03	6.80E-03	1.15E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.32E-01	--	1.32E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	4.70E-05	--	4.70E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.01E-04	--	2.01E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	8.10E-01	5.78E-04	1.13E+00	0.00E+00	0.00E+00	1.13E+00	6.60E-05	6.29E-03	1.13E+00				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	6.31E-05	--	6.31E-05				
Total LMW PAHs						1.13E+00	3.77E-04	6.29E-03	1.13E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	6.56E-05	--	6.56E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.21E-04	--	2.21E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	5.81E-04	--	5.81E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	8.34E-05	--	8.34E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.75E-05	--	1.75E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.21E-04	--	4.21E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	7.65E-06	--	7.65E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	3.74E-05	--	3.74E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.52E-04	--	1.52E-04				
Total HMW PAHs						0.00E+00	1.59E-03	0.00E+00	1.59E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	5.99E-04	--	5.99E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	1.30E-03	0.00E+00	0.00E+00	1.30E-03	0.00E+00	1.09E-04	1.41E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H20-3
Refined Exposure Evaluation - Mourning Dove
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-4
Refined Exposure Evaluation - Red-tailed Hawk
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.36E-02	0.00E+00	9.36E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	7.61E-05	--	7.61E-05	No TRV	--	No TRV	--
Arsenic	4.90E+00	9.37E-04	0.00E+00	0.00E+00	2.37E-03	2.37E-03	7.68E-05	1.05E-02	1.29E-02	2.24E+00	<1	4.51E+00	<1
Barium	1.58E+02	1.73E-01	0.00E+00	0.00E+00	8.85E-03	8.85E-03	1.42E-02	3.37E-01	3.60E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	2.14E-05	--	2.14E-05	No TRV	--	No TRV	--
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	5.58E-05	--	5.58E-05	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	2.44E-04	--	2.44E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.46E-04	0.00E+00	1.46E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.71E+01	9.09E-03	0.00E+00	0.00E+00	9.52E-01	9.52E-01	7.45E-04	3.65E-02	9.89E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.01E+01	1.75E-03	0.00E+00	0.00E+00	2.46E-01	2.46E-01	1.44E-04	2.14E-02	2.67E-01	1.63E+00	<1	4.46E+01	<1
Manganese	3.63E+02	1.34E-01	0.00E+00	0.00E+00	6.10E-01	6.10E-01	1.10E-02	7.73E-01	1.39E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.20E-05	--	1.20E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.25E-04	0.00E+00	3.25E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-05	0.00E+00	5.93E-05	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	2.08E-05	--	2.08E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-04	0.00E+00	1.91E-04	3.44E-01	<1	1.70E+00	<1
Zinc	4.70E+01	2.54E-02	0.00E+00	0.00E+00	8.45E+00	8.45E+00	2.08E-03	1.00E-01	8.55E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-03	1.87E-03	5.22E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	9.49E-02	--	9.49E-02	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	3.37E-05	--	3.37E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	1.44E-04	--	1.44E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	8.10E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E-05	1.73E-03	1.77E-03				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	4.54E-05	--	4.54E-05				
Total LMW PAHs						0.00E+00	2.71E-04	1.73E-03	2.00E-03	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	4.72E-05	--	4.72E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	4.17E-04	--	4.17E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	5.99E-05	--	5.99E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	1.26E-05	--	1.26E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	3.02E-04	--	3.02E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	5.49E-06	--	5.49E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	2.69E-05	--	2.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.09E-04	--	1.09E-04				
Total HMW PAHs						0.00E+00	1.14E-03	0.00E+00	1.14E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	4.31E-04	--	4.31E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	0.00E+00	0.00E+00	5.16E-04	5.16E-04	0.00E+00	2.99E-05	5.45E-04	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H20-4
Refined Exposure Evaluation - Red-tailed Hawk
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.47E-04	--	1.47E-04	No TRV	--	No TRV	--
Arsenic	4.90E+00	9.37E-04	0.00E+00	1.17E-01	0.00E+00	1.17E-01	1.48E-04	0.00E+00	1.18E-01	2.24E+00	<1	4.51E+00	<1
Barium	1.58E+02	1.73E-01	0.00E+00	2.28E+00	0.00E+00	2.28E+00	2.74E-02	0.00E+00	2.31E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	4.13E-05	--	4.13E-05	No TRV	--	No TRV	--
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	1.08E-04	--	1.08E-04	1.47E+00	<1	6.35E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.71E-04	--	4.71E-04	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	0.00E+00	2.82E-04	7.61E+00	<1	2.02E+01	<1
Copper	1.71E+01	9.09E-03	0.00E+00	1.39E+00	0.00E+00	1.39E+00	1.44E-03	0.00E+00	1.40E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.01E+01	1.75E-03	0.00E+00	8.20E-01	0.00E+00	8.20E-01	2.77E-04	0.00E+00	8.20E-01	1.63E+00	<1	4.46E+01	<1
Manganese	3.63E+02	1.34E-01	0.00E+00	3.92E+00	0.00E+00	3.92E+00	2.13E-02	0.00E+00	3.95E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.31E-05	--	2.31E-05	4.50E-01	<1	9.10E-01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.27E-04	0.00E+00	6.27E-04	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-04	0.00E+00	1.14E-04	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	4.02E-05	--	4.02E-05	3.50E-01	<1	3.50E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-04	0.00E+00	3.70E-04	3.44E-01	<1	1.70E+00	<1
Zinc	4.70E+01	2.54E-02	0.00E+00	4.79E+01	0.00E+00	4.79E+01	4.01E-03	0.00E+00	4.79E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	0.00E+00	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.83E-01	--	1.83E-01	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.52E-05	--	6.52E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.79E-04	--	2.79E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	8.10E-01	5.78E-04	0.00E+00	5.64E-01	0.00E+00	5.64E-01	9.15E-05	0.00E+00	5.64E-01				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.76E-05	--	8.76E-05				
Total LMW PAHs						5.64E-01	5.23E-04	0.00E+00	5.65E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	9.11E-05	--	9.11E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	3.07E-04	--	3.07E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	8.06E-04	--	8.06E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.16E-04	--	1.16E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.43E-05	--	2.43E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.84E-04	--	5.84E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.06E-05	--	1.06E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	5.19E-05	--	5.19E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.11E-04	--	2.11E-04				
Total HMW PAHs						0.00E+00	2.20E-03	0.00E+00	2.20E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	8.31E-04	--	8.31E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	0.00E+00	2.29E-02	0.00E+00	2.29E-02	0.00E+00	0.00E+00	2.29E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H20-5
Refined Exposure Evaluation - Yellow-billed Cuckoo
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-6
Refined Exposure Evaluation - Canada Lynx
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-02	0.00E+00	3.57E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	2.90E-05	--	2.90E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	4.90E+00	9.37E-04	0.00E+00	0.00E+00	9.02E-04	9.02E-04	2.93E-05	4.29E-03	5.22E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.58E+02	1.73E-01	0.00E+00	0.00E+00	3.37E-03	3.37E-03	5.40E-03	1.38E-01	1.47E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	8.15E-06	--	8.15E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	2.12E-05	--	2.12E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	9.29E-05	--	9.29E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.56E-05	0.00E+00	5.56E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.71E+01	9.09E-03	0.00E+00	0.00E+00	3.63E-01	3.63E-01	2.84E-04	1.50E-02	3.78E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.01E+01	1.75E-03	0.00E+00	0.00E+00	9.36E-02	9.36E-02	5.47E-05	8.80E-03	1.02E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.63E+02	1.34E-01	0.00E+00	0.00E+00	2.32E-01	2.32E-01	4.20E-03	3.17E-01	5.54E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.56E-06	--	4.56E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-04	0.00E+00	1.24E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-05	0.00E+00	2.26E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	7.94E-06	--	7.94E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.29E-05	0.00E+00	7.29E-05	4.16E+00	<1	9.44E+00	<1
Zinc	4.70E+01	2.54E-02	0.00E+00	0.00E+00	3.22E+00	3.22E+00	7.92E-04	4.11E-02	3.26E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	7.66E-04	2.04E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.62E-02	--	3.62E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.29E-05	--	1.29E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.50E-05	--	5.50E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	8.10E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-05	7.09E-04	7.27E-04				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Total LMW PAHs						0.00E+00	1.03E-04	7.09E-04	8.12E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	1.80E-05	--	1.80E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	6.06E-05	--	6.06E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.59E-04	--	1.59E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.28E-05	--	2.28E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.79E-06	--	4.79E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.15E-04	--	1.15E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.09E-06	--	2.09E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.02E-05	--	1.02E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.16E-05	--	4.16E-05				
Total HMW PAHs						0.00E+00	4.34E-04	0.00E+00	4.34E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	1.64E-04	--	1.64E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	0.00E+00	0.00E+00	1.96E-04	1.96E-04	0.00E+00	1.22E-05	2.09E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H20-6
Refined Exposure Evaluation - Canada Lynx
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-7
Refined Exposure Evaluation - Grizzly Bear
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	0.00E+00	2.47E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	0.00E+00	2.00E-05	--	2.00E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	4.90E+00	9.37E-04	2.58E-03	2.40E-03	6.23E-05	0.00E+00	5.05E-03	2.02E-05	2.96E-03	8.03E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.58E+02	1.73E-01	3.46E-01	4.66E-02	2.33E-04	0.00E+00	3.93E-01	3.73E-03	9.56E-02	4.93E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	0.00E+00	5.64E-06	--	5.64E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	0.00E+00	1.47E-05	--	1.47E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	0.00E+00	6.42E-05	--	6.42E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.84E-05	0.00E+00	3.84E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.71E+01	9.09E-03	8.38E-02	2.85E-02	2.51E-02	0.00E+00	1.37E-01	1.96E-04	1.03E-02	1.48E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.01E+01	1.75E-03	1.36E-02	1.68E-02	6.47E-03	0.00E+00	3.68E-02	3.78E-05	6.08E-03	4.29E-02	4.70E+00	<1	1.86E+02	<1
Manganese	3.63E+02	1.34E-01	4.02E-01	8.03E-02	1.61E-02	0.00E+00	4.98E-01	2.90E-03	2.19E-01	7.21E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	0.00E+00	3.15E-06	--	3.15E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.55E-05	0.00E+00	8.55E-05	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-05	0.00E+00	1.56E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	0.00E+00	5.49E-06	--	5.49E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-05	0.00E+00	5.04E-05	4.16E+00	<1	9.44E+00	<1
Zinc	4.70E+01	2.54E-02	5.72E-01	9.80E-01	2.22E-01	0.00E+00	1.77E+00	5.48E-04	2.84E-02	1.80E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	8.76E-01	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-04	5.30E-04	1.41E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	0.00E+00	2.50E-02	--	2.50E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	0.00E+00	8.89E-06	--	8.89E-06				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	0.00E+00	3.80E-05	--	3.80E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	8.10E-01	5.78E-04	1.39E-01	1.15E-02	0.00E+00	0.00E+00	1.50E-01	1.25E-05	4.90E-04	1.51E-01				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	0.00E+00	1.19E-05	--	1.19E-05				
Total LMW PAHs							1.50E-01	7.13E-05	4.90E-04	1.51E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	0.00E+00	1.24E-05	--	1.24E-05				
Benzo[A]Pyrene	ND	1.94E-03	--	--	--	0.00E+00	0.00E+00	4.19E-05	--	4.19E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	0.00E+00	1.58E-05	--	1.58E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	0.00E+00	3.31E-06	--	3.31E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	0.00E+00	7.96E-05	--	7.96E-05				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	0.00E+00	1.45E-06	--	1.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	0.00E+00	7.08E-06	--	7.08E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	0.00E+00	2.87E-05	--	2.87E-05				
Total HMW PAHs							0.00E+00	3.00E-04	0.00E+00	3.00E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	0.00E+00	1.13E-04	--	1.13E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	1.40E-02	0.00E+00	1.60E-04	4.68E-04	1.36E-05	0.00E+00	6.41E-04	0.00E+00	8.47E-06	6.50E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H20-7
Refined Exposure Evaluation - Grizzly Bear
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-8
Refined Exposure Evaluation - Long-tailed Weasel
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-02	0.00E+00	5.87E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	4.78E-05	--	4.78E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	4.88E+00	9.37E-04	0.00E+00	0.00E+00	1.48E-03	1.48E-03	4.82E-05	4.02E-03	5.54E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.41E+02	1.73E-01	0.00E+00	0.00E+00	4.96E-03	4.96E-03	8.90E-03	1.16E-01	1.30E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	1.34E-05	--	1.34E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	3.50E-05	--	3.50E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.15E-05	0.00E+00	9.15E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.59E+01	9.09E-03	0.00E+00	0.00E+00	5.91E-01	5.91E-01	4.68E-04	1.31E-02	6.05E-01	5.60E+00	<1	8.27E+01	<1
Lead	9.42E+00	1.75E-03	0.00E+00	0.00E+00	1.50E-01	1.50E-01	9.01E-05	7.76E-03	1.58E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.12E+02	1.34E-01	0.00E+00	0.00E+00	3.29E-01	3.29E-01	6.92E-03	2.57E-01	5.93E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	7.51E-06	--	7.51E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-04	0.00E+00	2.04E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E-05	0.00E+00	3.72E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	1.31E-05	--	1.31E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-04	0.00E+00	1.20E-04	4.16E+00	<1	9.44E+00	<1
Zinc	4.30E+01	2.54E-02	0.00E+00	0.00E+00	5.27E+00	5.27E+00	1.30E-03	3.54E-02	5.31E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.24E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-03	1.02E-03	3.12E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	5.96E-02	--	5.96E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	2.12E-05	--	2.12E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	9.06E-05	--	9.06E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	3.60E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.97E-05	2.96E-04	3.26E-04				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	2.85E-05	--	2.85E-05				
Total LMW PAHs						0.00E+00	1.70E-04	2.96E-04	4.66E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	2.96E-05	--	2.96E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	9.97E-05	--	9.97E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	2.62E-04	--	2.62E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	3.76E-05	--	3.76E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	7.88E-06	--	7.88E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.90E-04	--	1.90E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	3.45E-06	--	3.45E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	1.69E-05	--	1.69E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	6.84E-05	--	6.84E-05				
Total HMW PAHs						0.00E+00	7.15E-04	0.00E+00	7.15E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	2.70E-04	--	2.70E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	0.00E+00	0.00E+00	6.24E-04	6.24E-04	0.00E+00	2.22E-05	6.46E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H20-8
Refined Exposure Evaluation - Long-tailed Weasel
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-9
Refined Exposure Evaluation - Meadow Vole
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-01	0.00E+00	1.71E-01	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.39E-04	--	1.39E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	4.88E+00	9.37E-04	2.75E-02	0.00E+00	0.00E+00	2.75E-02	1.41E-04	9.53E-03	3.72E-02	1.04E+00	<1	4.55E+00	<1
Barium	1.41E+02	1.73E-01	3.31E+00	0.00E+00	0.00E+00	3.31E+00	2.60E-02	2.76E-01	3.61E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.92E-05	--	3.92E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	1.02E-04	--	1.02E-04	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	4.47E-04	--	4.47E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-04	0.00E+00	2.67E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.59E+01	9.09E-03	8.71E-01	0.00E+00	0.00E+00	8.71E-01	1.37E-03	3.11E-02	9.04E-01	5.60E+00	<1	8.27E+01	<1
Lead	9.42E+00	1.75E-03	1.40E-01	0.00E+00	0.00E+00	1.40E-01	2.63E-04	1.84E-02	1.59E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.12E+02	1.34E-01	3.70E+00	0.00E+00	0.00E+00	3.70E+00	2.02E-02	6.10E-01	4.33E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	2.19E-05	--	2.19E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.95E-04	0.00E+00	5.95E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-04	0.00E+00	1.09E-04	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	3.82E-05	--	3.82E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-04	0.00E+00	3.51E-04	4.16E+00	<1	9.44E+00	<1
Zinc	4.30E+01	2.54E-02	5.83E+00	0.00E+00	0.00E+00	5.83E+00	3.81E-03	8.39E-02	5.92E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.24E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.13E-03	2.42E-03	8.55E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.74E-01	--	1.74E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	6.18E-05	--	6.18E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.64E-04	--	2.64E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	3.60E-01	5.78E-04	6.60E-01	0.00E+00	0.00E+00	6.60E-01	8.69E-05	7.03E-04	6.61E-01				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	8.31E-05	--	8.31E-05				
Total LMW PAHs						6.60E-01	4.96E-04	7.03E-04	6.61E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	8.64E-05	--	8.64E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.91E-04	--	2.91E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	7.65E-04	--	7.65E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	1.10E-04	--	1.10E-04				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	5.54E-04	--	5.54E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	1.01E-05	--	1.01E-05				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.92E-05	--	4.92E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	2.00E-04	--	2.00E-04				
Total HMW PAHs						0.00E+00	2.09E-03	0.00E+00	2.09E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	7.89E-04	--	7.89E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	3.30E-03	0.00E+00	0.00E+00	3.30E-03	0.00E+00	5.27E-05	3.36E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H20-9
Refined Exposure Evaluation - Meadow Vole
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-10
Refined Exposure Evaluation - North American Wolverine
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-02	0.00E+00	3.43E-02	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	2.79E-05	--	2.79E-05	5.90E-02	<1	2.76E+00	<1
Arsenic	4.88E+00	9.37E-04	0.00E+00	0.00E+00	8.63E-04	8.63E-04	2.81E-05	4.10E-03	4.99E-03	1.04E+00	<1	4.55E+00	<1
Barium	1.41E+02	1.73E-01	0.00E+00	0.00E+00	2.90E-03	2.90E-03	5.19E-03	1.19E-01	1.27E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	7.84E-06	--	7.84E-06	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	2.04E-05	--	2.04E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	8.93E-05	--	8.93E-05	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.34E-05	0.00E+00	5.34E-05	7.33E+00	<1	1.89E+01	<1
Copper	1.59E+01	9.09E-03	0.00E+00	0.00E+00	3.45E-01	3.45E-01	2.73E-04	1.34E-02	3.59E-01	5.60E+00	<1	8.27E+01	<1
Lead	9.42E+00	1.75E-03	0.00E+00	0.00E+00	8.74E-02	8.74E-02	5.26E-05	7.92E-03	9.54E-02	4.70E+00	<1	1.86E+02	<1
Manganese	3.12E+02	1.34E-01	0.00E+00	0.00E+00	1.92E-01	1.92E-01	4.04E-03	2.63E-01	4.59E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	4.39E-06	--	4.39E-06	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-04	0.00E+00	1.19E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-05	0.00E+00	2.17E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	7.63E-06	--	7.63E-06	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.02E-05	0.00E+00	7.02E-05	4.16E+00	<1	9.44E+00	<1
Zinc	4.30E+01	2.54E-02	0.00E+00	0.00E+00	3.08E+00	3.08E+00	7.62E-04	3.62E-02	3.11E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.24E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.04E-03	2.27E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	3.48E-02	--	3.48E-02	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	1.24E-05	--	1.24E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	5.29E-05	--	5.29E-05				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	3.60E-01	5.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-05	3.03E-04	3.20E-04				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	1.66E-05	--	1.66E-05				
Total LMW PAHs						0.00E+00	9.92E-05	3.03E-04	4.02E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	1.73E-05	--	1.73E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	5.82E-05	--	5.82E-05				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	1.53E-04	--	1.53E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	2.20E-05	--	2.20E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	4.60E-06	--	4.60E-06				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	1.11E-04	--	1.11E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	2.01E-06	--	2.01E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	9.85E-06	--	9.85E-06				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	4.00E-05	--	4.00E-05				
Total HMW PAHs						0.00E+00	4.18E-04	0.00E+00	4.18E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	1.58E-04	--	1.58E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	0.00E+00	0.00E+00	3.64E-04	3.64E-04	0.00E+00	2.27E-05	3.87E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H20-10
Refined Exposure Evaluation - North American Wolverine
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H20-11
Refined Exposure Evaluation - Short-tailed Shrew
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-01	0.00E+00	1.53E-01	No TRV	--	No TRV	--
Antimony	ND	9.28E-04	--	--	--	0.00E+00	1.24E-04	--	1.24E-04	5.90E-02	<1	2.76E+00	<1
Arsenic	4.88E+00	9.37E-04	0.00E+00	9.91E-02	0.00E+00	9.91E-02	1.26E-04	7.19E-03	1.06E-01	1.04E+00	<1	4.55E+00	<1
Barium	1.41E+02	1.73E-01	0.00E+00	1.72E+00	0.00E+00	1.72E+00	2.32E-02	2.08E-01	1.95E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	2.61E-04	--	--	--	0.00E+00	3.50E-05	--	3.50E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	ND	6.80E-04	--	--	--	0.00E+00	9.11E-05	--	9.11E-05	7.70E-01	<1	6.87E+00	<1
Chromium	ND	2.97E-03	--	--	--	0.00E+00	3.99E-04	--	3.99E-04	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-04	0.00E+00	2.38E-04	7.33E+00	<1	1.89E+01	<1
Copper	1.59E+01	9.09E-03	0.00E+00	1.10E+00	0.00E+00	1.10E+00	1.22E-03	2.34E-02	1.12E+00	5.60E+00	<1	8.27E+01	<1
Lead	9.42E+00	1.75E-03	0.00E+00	6.58E-01	0.00E+00	6.58E-01	2.35E-04	1.39E-02	6.73E-01	4.70E+00	<1	1.86E+02	<1
Manganese	3.12E+02	1.34E-01	0.00E+00	3.00E+00	0.00E+00	3.00E+00	1.80E-02	4.60E-01	3.48E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	1.46E-04	--	--	--	0.00E+00	1.96E-05	--	1.96E-05	1.41E+00	<1	1.41E+01	<1
Nickel	0.00E+00	3.96E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E-04	0.00E+00	5.31E-04	1.70E+00	<1	1.48E+01	<1
Selenium	0.00E+00	7.23E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	0.00E+00	9.69E-05	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	2.54E-04	--	--	--	0.00E+00	3.40E-05	--	3.40E-05	4.80E-01	<1	1.43E+00	<1
Vanadium	0.00E+00	2.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	3.13E-04	4.16E+00	<1	9.44E+00	<1
Zinc	4.30E+01	2.54E-02	0.00E+00	3.94E+01	0.00E+00	3.94E+01	3.40E-03	6.34E-02	3.94E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	1.24E+00	4.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-03	1.82E-03	7.30E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	1.16E+00	--	--	--	0.00E+00	1.55E-01	--	1.55E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	4.12E-04	--	--	--	0.00E+00	5.51E-05	--	5.51E-05				
Fluoranthene	ND	1.76E-03	--	--	--	0.00E+00	2.36E-04	--	2.36E-04				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	3.60E-01	5.78E-04	0.00E+00	2.12E-01	0.00E+00	2.12E-01	7.75E-05	5.31E-04	2.13E-01				
Phenanthrene	ND	5.53E-04	--	--	--	0.00E+00	7.41E-05	--	7.41E-05				
Total LMW PAHs						2.12E-01	4.43E-04	5.31E-04	2.13E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	5.75E-04	--	--	--	0.00E+00	7.71E-05	--	7.71E-05				
Benzo(A)Pyrene	ND	1.94E-03	--	--	--	0.00E+00	2.60E-04	--	2.60E-04				
Benzo(b)fluoranthene	ND	5.09E-03	--	--	--	0.00E+00	6.82E-04	--	6.82E-04				
Benzo(g,h,i)perylene	ND	7.31E-04	--	--	--	0.00E+00	9.79E-05	--	9.79E-05				
Benzo(k)fluoranthene	ND	1.53E-04	--	--	--	0.00E+00	2.05E-05	--	2.05E-05				
Chrysene	ND	3.69E-03	--	--	--	0.00E+00	4.94E-04	--	4.94E-04				
Dibenz(A,H)Anthracene	ND	6.70E-05	--	--	--	0.00E+00	8.98E-06	--	8.98E-06				
Indeno (1,2,3-CD) Pyrene	ND	3.28E-04	--	--	--	0.00E+00	4.39E-05	--	4.39E-05				
Pyrene	ND	1.33E-03	--	--	--	0.00E+00	1.78E-04	--	1.78E-04				
Total HMW PAHs						0.00E+00	1.86E-03	0.00E+00	1.86E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	5.25E-03	--	--	--	0.00E+00	7.04E-04	--	7.04E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.70E-02	0.00E+00	0.00E+00	3.73E-02	0.00E+00	3.73E-02	0.00E+00	3.98E-05	3.74E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H20-11
Refined Exposure Evaluation - Short-tailed Shrew
Flathead River Riparian Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	9.30E-01	Regression ^a	3.69E-02	USEPA (2007)	1.00E+00	9.30E-01	Assumption ^c	5.00E-02	4.65E-02	Baes et al. (1984) ^e
Arsenic	NA	1.35E+01	3.75E-02	5.08E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.52E+00	Sample et al. (1999)	Regression ^f	6.63E-02	Sample et al. (1998b)
Barium	NA	2.45E+02	1.56E-01	3.82E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.23E+01	Sample et al. (1998a)	6.83E-04	1.67E-01	Baes et al. (1984) ^e
Beryllium	NA	3.99E+00	Regression ^a	1.62E+00	USEPA (2007)	4.50E-02	1.80E-01	Sample et al. (1998a)	2.25E-03	8.99E-03	Baes et al. (1984) ^e
Cadmium	NA	3.62E+00	Regression ^a	1.26E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.30E+01	Sample et al. (1999)	Regression ^f	5.22E-01	Sample et al. (1998b)
Chromium	NA	2.87E+01	4.10E-02	1.18E+00	Bechtel-Jacobs (1998a) ^g	3.06E-01	8.79E+00	Sample et al. (1998a)	Regression ^f	2.73E+00	Sample et al. (1998b)
Cobalt	NA	9.47E+00	7.50E-03	7.10E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	1.16E+00	Sample et al. (1998a)	Regression ^f	2.17E-01	Sample et al. (1998b)
Copper	NA	4.43E+01	Regression ^a	8.69E+00	Bechtel-Jacobs (1998a)	5.15E-01	2.28E+01	Sample et al. (1998a)	Regression ^f	1.33E+01	Sample et al. (1998b)
Lead	NA	1.11E+02	Regression ^a	3.72E+00	Bechtel-Jacobs (1998a)	Regression ^d	3.59E+01	Sample et al. (1999)	Regression ^f	8.65E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	6.31E-02	Regression ^a	8.22E-02	Bechtel-Jacobs (1998a)	3.93E+00	2.48E-01	Sample et al. (1998a)	3.81E-01	2.41E-02	LANL (2015)
Nickel	NA	3.60E+02	Regression ^a	8.84E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.80E+02	Sample et al. (1998a)	Regression ^f	1.21E+01	Sample et al. (1998b)
Selenium	NA	1.83E+00	Regression ^a	9.88E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.44E+00	Sample et al. (1998a)	Regression ^f	8.28E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	1.89E+00	4.00E-03	7.56E-03	Baes et al. (1984)	5.41E-02	1.02E-01	USCHPPM (2004)	1.08E-01	2.05E-01	Baes et al. (1984) ^e
Vanadium	NA	1.10E+02	4.85E-03	5.35E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	4.63E+00	Sample et al. (1998a)	1.23E-02	1.36E+00	Sample et al. (1998b) ⁱ
Zinc	NA	3.42E+02	Regression ^a	1.22E+02	Bechtel-Jacobs (1998a)	Regression ^d	5.80E+02	Sample et al. (1998a)	Regression ^f	1.19E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	4.12E+01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.47E+02	6.00E-02	8.80E+00	Baes et al. (1984)	1.24E-01	1.82E+01	USCHPPM (2004)	1.60E-02	2.35E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	8.19E+01	Regression ^a	8.86E-05	USEPA (2007a)	1.47E+00	1.20E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	1.13E+02	Regression ^a	1.47E+01	USEPA (2007a)	2.42E+00	2.73E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	2.24E+03	5.00E-01	1.12E+03	USEPA (2007a)	3.04E+00	6.80E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	2.57E+01	Regression ^a	2.39E-04	USEPA (2007a)	9.57E+00	2.46E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	3.65E+00	1.22E+01	4.45E+01	USEPA (2007a)	4.40E+00	1.61E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	2.85E+02	Regression ^a	2.82E+01	USEPA (2007a)	1.72E+00	4.91E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h

Table H21-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	1.12E+03	Regression ^a	4.33E+00	USEPA (2007a)	1.59E+00	1.78E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.27E+03	Regression ^a	1.35E+02	USEPA (2007a)	1.33E+00	1.69E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	1.00E+03	3.10E-01	3.11E+02	USEPA (2007a)	2.60E+00	2.61E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	6.99E+02	Regression ^a	9.13E+02	USEPA (2007a)	2.94E+00	2.06E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	7.20E+02	Regression ^a	3.30E+01	USEPA (2007a)	2.60E+00	1.87E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Chrysene	5.7	1.17E+03	Regression ^a	4.44E+00	USEPA (2007a)	2.29E+00	2.67E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	2.37E+02	1.30E-01	3.08E+01	USEPA (2007a)	2.31E+00	5.47E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	6.43E+02	1.10E-01	7.07E+01	USEPA (2007a)	2.86E+00	1.84E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	1.96E+03	7.20E-01	1.41E+03	USEPA (2007a)	1.75E+00	3.44E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	1.80E-01	2.38E-02	4.28E-03	USEPA (2007a)	5.44E+01	9.79E+00	USEPA (2007a)	7.79E-01	1.40E-01	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	7.70E+00	1.88E+00	1.45E+01	USEPA (2007a)	6.96E+00	5.36E+01	USEPA (2007a)	5.60E-02	4.32E-01	Calculated ^j
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H21-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H21-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-9.96E-01	0.544	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H21-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	6.04E-01	Regression ^a	2.46E-02	USEPA (2007)	1.00E+00	6.04E-01	Assumption ^c	5.00E-02	3.02E-02	Baes et al. (1984) ^e
Arsenic	NA	1.46E+01	3.75E-02	5.47E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.60E+00	Sample et al. (1999)	Regression ^f	7.04E-02	Sample et al. (1998b)
Barium	NA	4.73E+02	1.56E-01	7.38E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	4.31E+01	Sample et al. (1998a)	6.83E-04	3.23E-01	Baes et al. (1984) ^e
Beryllium	NA	6.46E+00	Regression ^a	2.30E+00	USEPA (2007)	4.50E-02	2.91E-01	Sample et al. (1998a)	2.25E-03	1.45E-02	Baes et al. (1984) ^e
Cadmium	NA	3.05E+00	Regression ^a	1.14E+00	Bechtel-Jacobs (1998a)	Regression ^d	2.01E+01	Sample et al. (1999)	Regression ^f	4.82E-01	Sample et al. (1998b)
Chromium	NA	2.32E+01	4.10E-02	9.50E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	7.09E+00	Sample et al. (1998a)	Regression ^f	2.33E+00	Sample et al. (1998b)
Cobalt	NA	7.37E+00	7.50E-03	5.53E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	9.00E-01	Sample et al. (1998a)	Regression ^f	1.56E-01	Sample et al. (1998b)
Copper	NA	2.66E+01	Regression ^a	7.11E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.37E+01	Sample et al. (1998a)	Regression ^f	1.24E+01	Sample et al. (1998b)
Lead	NA	9.67E+01	Regression ^a	3.44E+00	Bechtel-Jacobs (1998a)	Regression ^d	3.22E+01	Sample et al. (1999)	Regression ^f	8.15E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	3.13E-02	Regression ^a	5.61E-02	Bechtel-Jacobs (1998a)	3.93E+00	1.23E-01	Sample et al. (1998a)	3.81E-01	1.19E-02	LANL (2015)
Nickel	NA	3.26E+02	Regression ^a	8.22E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.54E+02	Sample et al. (1998a)	Regression ^f	1.16E+01	Sample et al. (1998b)
Selenium	NA	1.13E+00	Regression ^a	5.81E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.01E+00	Sample et al. (1998a)	Regression ^f	6.91E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	1.99E+00	4.00E-03	7.94E-03	Baes et al. (1984)	5.41E-02	1.07E-01	USCHPPM (2004)	1.08E-01	2.15E-01	Baes et al. (1984) ^e
Vanadium	NA	7.64E+01	4.85E-03	3.70E-01	Bechtel-Jacobs (1998a) ^g	4.20E-02	3.21E+00	Sample et al. (1998a)	1.23E-02	9.40E-01	Sample et al. (1998b) ⁱ
Zinc	NA	2.45E+02	Regression ^a	1.02E+02	Bechtel-Jacobs (1998a)	Regression ^d	5.20E+02	Sample et al. (1998a)	Regression ^f	1.16E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	4.45E+01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	1.10E+02	6.00E-02	6.59E+00	Baes et al. (1984)	1.24E-01	1.36E+01	USCHPPM (2004)	1.60E-02	1.76E+00	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	2.49E+01	Regression ^a	2.45E-04	USEPA (2007a)	1.47E+00	3.67E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	4.90E+01	Regression ^a	7.70E+00	USEPA (2007a)	2.42E+00	1.19E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluoranthene	4.95	6.10E+02	5.00E-01	3.05E+02	USEPA (2007a)	3.04E+00	1.85E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Fluorene	4.18	1.30E+01	Regression ^a	4.27E-04	USEPA (2007a)	9.57E+00	1.25E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Naphthalene	3.36	2.39E+00	1.22E+01	2.92E+01	USEPA (2007a)	4.40E+00	1.05E+01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Phenanthrene	4.55	2.00E+02	Regression ^a	2.27E+01	USEPA (2007a)	1.72E+00	3.45E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
LMW PAHs											

Table H21-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	3.11E+02	Regression ^a	2.02E+00	USEPA (2007a)	1.59E+00	4.94E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	3.40E+02	Regression ^a	3.74E+01	USEPA (2007a)	1.33E+00	4.52E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	5.22E+02	3.10E-01	1.62E+02	USEPA (2007a)	2.60E+00	1.36E+03	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	2.46E+02	Regression ^a	2.65E+02	USEPA (2007a)	2.94E+00	7.23E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	3.44E+02	Regression ^a	1.75E+01	USEPA (2007a)	2.60E+00	8.93E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Chrysene	5.7	3.58E+02	Regression ^a	2.20E+00	USEPA (2007a)	2.29E+00	8.21E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	1.17E+02	1.30E-01	1.53E+01	USEPA (2007a)	2.31E+00	2.71E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	2.25E+02	1.10E-01	2.48E+01	USEPA (2007a)	2.86E+00	6.44E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Pyrene	4.88	5.21E+02	7.20E-01	3.75E+02	USEPA (2007a)	1.75E+00	9.11E+02	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	4.58E+00	2.38E-02	1.09E-01	USEPA (2007a)	5.44E+01	2.49E+02	USEPA (2007a)	7.79E-01	3.56E+00	LANL (2015)
Butylbenzylphthalate	4.84	0.00E+00	6.54E-01	0.00E+00	USEPA (2007a)	1.14E+01	0.00E+00	USEPA (2007a)	1.22E-01	0.00E+00	LANL (2015)
Dibenzofuran	3.71	4.72E+00	1.88E+00	8.87E+00	USEPA (2007a)	6.96E+00	3.28E+01	USEPA (2007a)	5.60E-02	2.64E-01	Calculated ^d
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)

Table H21-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H21-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - North Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-0.996	5.44E-01	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H21-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - North Percolation Pond
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	8.63E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	9.30E-01	NA	5.75E-01	---	5.35E-01	Dovick et al. (2015)
Arsenic	NA	0.00E+00	1.35E+01	NA	3.73E-01	---	5.05E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	2.34E-01	2.45E+02	NA	2.82E+00	---	6.90E+02	Hamilton et al. (2002)
Beryllium	NA	7.10E-04	3.99E+00	NA	1.67E-01	---	6.67E-01	Hamilton et al. (2002)
Cadmium	NA	3.00E-03	3.62E+00	NA	4.59E-01	---	1.66E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	2.87E+01	NA	8.30E-02	---	2.38E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	1.65E-02	4.43E+01	NA	6.61E-01	---	2.93E+01	Bechtel-Jacobs (1998b) ^c
Lead	NA	7.60E-03	1.11E+02	NA	8.00E-02	---	8.85E+00	Bechtel-Jacobs (1998b) ^c
Manganese		0.00E+00	0.00E+00					
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	5.59E-02	3.60E+02	NA	1.34E-01	---	4.82E+01	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	1.83E+00	NA	3.75E+00	---	6.85E+00	Hamilton et al. (2002)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)
Thallium	NA	0.00E+00	1.89E+00	NA	2.00E-02	---	3.78E-02	Turner et al. (2013)
Vanadium	NA	1.80E-02	1.10E+02	NA	2.50E-01	---	2.76E+01	Hamilton and Buhl (2002)
Zinc	NA	5.37E-01	3.42E+02	NA	8.40E-01	---	2.88E+02	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	7.60E-03	4.12E+01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	2.24E+01	0.00E+00	NA	---	Regression	1.37E+02	Derived based on Aguirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	8.19E+01	7.04E-01	4.58E+00	---	3.75E+02	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	3.20E-01	7.54E-01	4.90E+00	---	1.57E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	1.13E+02	6.73E-01	4.37E+00	---	4.94E+02	DiToro and McGrath (2000)
Fluoranthene	5.08	9.30E-03	2.24E+03	6.41E-01	4.17E+00	---	9.32E+03	DiToro and McGrath (2000)

Table H21-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - North Percolation Pond
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	2.57E+01	6.92E-01	4.50E+00	---	1.16E+02	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	3.65E+00	7.45E-01	4.84E+00	---	1.77E+01	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	2.85E+02	6.70E-01	4.36E+00	---	1.24E+03	DiToro and McGrath (2000)
Total LMW PAHs							1.16E+04	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	3.00E-03	1.12E+03	5.56E-01	3.61E+00	---	4.04E+03	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	3.90E+00	1.27E+03	5.86E-01	3.81E+00	---	4.83E+03	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	1.00E-02	1.00E+03	5.78E-01	3.76E+00	---	3.77E+03	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	3.90E-03	6.99E+02	5.66E-01	3.68E+00	---	2.57E+03	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	7.20E+02	5.77E-01	3.75E+00	---	2.70E+03	DiToro and McGrath (2000)
Chrysene	5.71	7.60E-03	1.17E+03	6.07E-01	3.94E+00	---	4.60E+03	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	2.37E+02	5.56E-01	3.61E+00	---	8.55E+02	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	3.10E-03	6.43E+02	5.55E-01	3.61E+00	---	2.32E+03	DiToro and McGrath (2000)
Pyrene	4.92	7.00E-03	1.96E+03	6.50E-01	4.23E+00	---	8.30E+03	DiToro and McGrath (2000)
Total HMW PAHs							3.40E+04	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					

Table H21-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - North Percolation Pond
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:
NA, Normalized BSAF was not applicable for metals
a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)
b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:
$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lip;id} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)
f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)
f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)
c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H21-3
Refined Exposure Evaluation - American Dipper
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+00	0.00E+00	1.43E+00	1.10E+02	<1	1.10E+03	<1
Antimony	9.30E-01	0.00E+00	8.87E-02	0.00E+00	8.87E-02	0.00E+00	3.09E-03	9.18E-02	No TRV	--	No TRV	--
Arsenic	1.35E+01	0.00E+00	8.39E-01	0.00E+00	8.39E-01	0.00E+00	4.50E-02	8.84E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.45E+02	2.34E-01	1.14E+02	0.00E+00	1.14E+02	3.88E-02	8.12E-01	1.15E+02	7.35E+01	1.57E+00	1.31E+02	<1
Beryllium	3.99E+00	7.10E-04	1.11E-01	0.00E+00	1.11E-01	1.18E-04	1.33E-02	1.24E-01	No TRV	--	No TRV	--
Cadmium	3.62E+00	3.00E-03	2.76E-01	0.00E+00	2.76E-01	4.98E-04	1.20E-02	2.88E-01	1.47E+00	<1	6.35E+00	<1
Chromium	2.87E+01	0.00E+00	3.95E-01	0.00E+00	3.95E-01	0.00E+00	9.53E-02	4.91E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.43E+01	1.65E-02	4.86E+00	0.00E+00	4.86E+00	2.74E-03	1.47E-01	5.01E+00	4.05E+00	1.24E+00	3.48E+01	<1
Lead	1.11E+02	7.60E-03	1.47E+00	0.00E+00	1.47E+00	1.26E-03	3.67E-01	1.84E+00	1.63E+00	1.13E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.60E+02	5.59E-02	8.00E+00	0.00E+00	8.00E+00	9.28E-03	1.19E+00	9.20E+00	6.71E+00	1.37E+00	1.86E+01	<1
Selenium	1.83E+00	0.00E+00	1.14E+00	0.00E+00	1.14E+00	0.00E+00	6.06E-03	1.14E+00	2.90E-01	3.94E+00	8.20E-01	1.39E+00
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.89E+00	0.00E+00	6.27E-03	0.00E+00	6.27E-03	0.00E+00	6.27E-03	1.25E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	1.10E+02	1.80E-02	4.58E+00	0.00E+00	4.58E+00	2.99E-03	3.66E-01	4.95E+00	3.44E-01	1.44E+01	1.70E+00	2.91E+00
Zinc	3.42E+02	5.37E-01	4.77E+01	0.00E+00	4.77E+01	8.91E-02	1.14E+00	4.89E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	1.26E-03	1.37E-01	1.38E-01	4.00E-02	3.45E+00	4.00E-01	<1
Fluoride	0.00E+00	2.24E+01	2.27E+01	0.00E+00	2.27E+01	3.72E+00	0.00E+00	2.65E+01	1.22E+01	2.17E+00	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	8.19E+01	0.00E+00	6.22E+01	0.00E+00	6.22E+01	0.00E+00	2.72E-01	6.25E+01				
Acenaphthylene	3.20E-01	0.00E+00	2.60E-01	0.00E+00	2.60E-01	0.00E+00	1.06E-03	2.61E-01				
Anthracene	1.13E+02	0.00E+00	8.20E+01	0.00E+00	8.20E+01	0.00E+00	3.75E-01	8.24E+01				
Fluoranthene	2.24E+03	9.30E-03	1.55E+03	0.00E+00	1.55E+03	1.54E-03	7.42E+00	1.55E+03				
Fluorene	2.57E+01	0.00E+00	1.92E+01	0.00E+00	1.92E+01	0.00E+00	8.53E-02	1.93E+01				
Naphthalene	3.65E+00	0.00E+00	2.93E+00	0.00E+00	2.93E+00	0.00E+00	1.21E-02	2.95E+00				
Phenanthrene	2.85E+02	0.00E+00	2.06E+02	0.00E+00	2.06E+02	0.00E+00	9.46E-01	2.07E+02				
Total LMW PAHs					1.92E+03	1.54E-03	9.11E+00	1.93E+03	1.61E+01	1.20E+02	1.61E+02	1.20E+01
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.12E+03	3.00E-03	6.71E+02	0.00E+00	6.71E+02	4.98E-04	3.71E+00	6.75E+02				
Benzo(A)Pyrene	1.27E+03	3.90E+00	8.02E+02	0.00E+00	8.02E+02	6.47E-01	4.21E+00	8.07E+02				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	6.26E+02	0.00E+00	6.26E+02	1.66E-03	3.33E+00	6.29E+02				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	4.27E+02	0.00E+00	4.27E+02	6.47E-04	2.32E+00	4.29E+02				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	4.48E+02	0.00E+00	4.48E+02	0.00E+00	2.39E+00	4.50E+02				
Chrysene	1.17E+03	7.60E-03	7.63E+02	0.00E+00	7.63E+02	1.26E-03	3.87E+00	7.67E+02				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	1.42E+02	0.00E+00	1.42E+02	0.00E+00	7.85E-01	1.43E+02				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	3.85E+02	0.00E+00	3.85E+02	5.14E-04	2.13E+00	3.87E+02				
Pyrene	1.96E+03	7.00E-03	1.38E+03	0.00E+00	1.38E+03	1.16E-03	6.52E+00	1.38E+03				
Total HMW PAHs					5.64E+03	6.53E-01	2.93E+01	5.67E+03	2.00E+00	2.84E+03	2.00E+01	2.84E+02
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H21-3
Refined Exposure Evaluation - American Dipper
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-4
Refined Exposure Evaluation - American Woodcock
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E+00	0.00E+00	1.01E+00	1.10E+02	<1	1.10E+03	<1
Antimony	9.30E-01	0.00E+00	4.33E-04	9.84E-02	0.00E+00	9.88E-02	0.00E+00	8.20E-03	1.07E-01	No TRV	--	No TRV	--
Arsenic	1.35E+01	0.00E+00	5.97E-03	1.61E-01	0.00E+00	1.67E-01	0.00E+00	1.19E-01	2.86E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.45E+02	2.34E-01	4.48E-01	2.35E+00	0.00E+00	2.80E+00	2.75E-02	2.15E+00	4.98E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	3.99E+00	7.10E-04	1.90E-02	1.90E-02	0.00E+00	3.80E-02	8.34E-05	3.52E-02	7.33E-02	No TRV	--	No TRV	--
Cadmium	3.62E+00	3.00E-03	1.47E-02	2.43E+00	0.00E+00	2.45E+00	3.52E-04	3.19E-02	2.48E+00	1.47E+00	1.69E+00	6.35E+00	<1
Chromium	2.87E+01	0.00E+00	1.38E-02	9.29E-01	0.00E+00	9.43E-01	0.00E+00	2.53E-01	1.20E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	9.47E+00	0.00E+00	8.35E-04	1.22E-01	0.00E+00	1.23E-01	0.00E+00	8.35E-02	2.06E-01	7.61E+00	<1	2.02E+01	<1
Copper	4.43E+01	1.65E-02	1.02E-01	2.41E+00	0.00E+00	2.52E+00	1.94E-03	3.91E-01	2.91E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.11E+02	7.60E-03	4.36E-02	3.79E+00	0.00E+00	3.84E+00	8.93E-04	9.75E-01	4.81E+00	1.63E+00	2.95E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	6.31E-02	0.00E+00	9.66E-04	2.62E-02	0.00E+00	2.72E-02	0.00E+00	5.56E-04	2.78E-02	4.50E-01	<1	9.10E-01	<1
Nickel	3.60E+02	5.59E-02	1.04E-01	2.96E+01	0.00E+00	2.97E+01	6.57E-03	3.17E+00	3.29E+01	6.71E+00	4.90E+00	1.86E+01	1.77E+00
Selenium	1.83E+00	0.00E+00	1.16E-02	1.52E-01	0.00E+00	1.64E-01	0.00E+00	1.61E-02	1.80E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.89E+00	0.00E+00	8.89E-05	1.08E-02	0.00E+00	1.09E-02	0.00E+00	1.67E-02	2.76E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	1.10E+02	1.80E-02	6.29E-03	4.90E-01	0.00E+00	4.96E-01	2.11E-03	9.72E-01	1.47E+00	3.44E-01	4.28E+00	1.70E+00	<1
Zinc	3.42E+02	5.37E-01	1.44E+00	6.13E+01	0.00E+00	6.28E+01	6.31E-02	3.02E+00	6.59E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E-04	3.63E-01	3.63E-01	4.00E-02	9.09E+00	4.00E-01	<1
Fluoride	1.47E+02	2.24E+01	1.03E-01	1.92E+00	0.00E+00	2.03E+00	2.63E+00	1.29E+00	5.95E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	8.19E+01	0.00E+00	1.04E-06	1.27E+01	0.00E+00	1.27E+01	0.00E+00	7.21E-01	1.34E+01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.13E+02	0.00E+00	1.73E-01	2.89E+01	0.00E+00	2.91E+01	0.00E+00	9.96E-01	3.01E+01				
Fluoranthene	2.24E+03	9.30E-03	1.31E+01	7.19E+02	0.00E+00	7.32E+02	1.09E-03	1.97E+01	7.51E+02				
Fluorene	2.57E+01	0.00E+00	2.81E-06	2.60E+01	0.00E+00	2.60E+01	0.00E+00	2.26E-01	2.62E+01				
Naphthalene	3.65E+00	0.00E+00	5.23E-01	1.70E+00	0.00E+00	2.22E+00	0.00E+00	3.22E-02	2.25E+00				
Phenanthrene	2.85E+02	0.00E+00	3.32E-01	5.19E+01	0.00E+00	5.22E+01	0.00E+00	2.51E+00	5.47E+01				
Total LMW PAHs						8.54E+02	1.09E-03	2.42E+01	8.78E+02	1.61E+01	5.45E+01	1.61E+02	5.45E+00
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.12E+03	3.00E-03	5.08E-02	1.88E+02	0.00E+00	1.88E+02	3.52E-04	9.86E+00	1.98E+02				
Benzo(A)Pyrene	1.27E+03	3.90E+00	1.59E+00	1.78E+02	0.00E+00	1.80E+02	4.58E-01	1.12E+01	1.92E+02				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	3.66E+00	2.76E+02	0.00E+00	2.80E+02	1.17E-03	8.85E+00	2.89E+02				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	1.07E+01	2.17E+02	0.00E+00	2.28E+02	4.58E-04	6.16E+00	2.34E+02				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	3.88E-01	1.98E+02	0.00E+00	1.98E+02	0.00E+00	6.35E+00	2.05E+02				
Chrysene	1.17E+03	7.60E-03	5.21E-02	2.82E+02	0.00E+00	2.82E+02	8.93E-04	1.03E+01	2.93E+02				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	3.61E-01	5.78E+01	0.00E+00	5.82E+01	0.00E+00	2.08E+00	6.02E+01				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	8.31E-01	1.94E+02	0.00E+00	1.95E+02	3.64E-04	5.67E+00	2.01E+02				
Pyrene	1.96E+03	7.00E-03	1.66E+01	3.64E+02	0.00E+00	3.80E+02	8.22E-04	1.73E+01	3.97E+02				
Total HMW PAHs						1.99E+03	4.62E-01	7.77E+01	2.07E+03	2.00E+00	1.03E+03	2.00E+01	1.03E+02
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	5.03E-05	1.04E+00	0.00E+00	1.04E+00	0.00E+00	1.59E-03	1.04E+00	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	7.70E+00	0.00E+00	1.70E-01	5.67E+00	0.00E+00	5.84E+00	0.00E+00	6.79E-02	5.90E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	ND	--	--	--	0.00E+00	--	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H21-4
Refined Exposure Evaluation - American Woodcock
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-5
Refined Exposure Evaluation - Belted Kingfisher
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	1.36E+00	0.00E+00	1.36E+00	1.10E+02	<1	1.10E+03	<1
Antimony	9.30E-01	0.00E+00	8.43E-03	0.00E+00	8.43E-03	0.00E+00	0.00E+00	8.43E-03	No TRV	--	No TRV	--
Arsenic	1.35E+01	0.00E+00	7.96E-02	0.00E+00	7.96E-02	0.00E+00	0.00E+00	7.96E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.45E+02	2.34E-01	1.09E+01	0.00E+00	1.09E+01	3.69E-02	0.00E+00	1.09E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	3.99E+00	7.10E-04	1.05E-02	0.00E+00	1.05E-02	1.12E-04	0.00E+00	1.06E-02	No TRV	--	No TRV	--
Cadmium	3.62E+00	3.00E-03	2.62E-02	0.00E+00	2.62E-02	4.73E-04	0.00E+00	2.67E-02	1.47E+00	<1	6.35E+00	<1
Chromium	2.87E+01	0.00E+00	3.76E-02	0.00E+00	3.76E-02	0.00E+00	0.00E+00	3.76E-02	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	4.43E+01	1.65E-02	4.62E-01	0.00E+00	4.62E-01	2.60E-03	0.00E+00	4.64E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.11E+02	7.60E-03	1.40E-01	0.00E+00	1.40E-01	1.20E-03	0.00E+00	1.41E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.60E+02	5.59E-02	7.60E-01	0.00E+00	7.60E-01	8.81E-03	0.00E+00	7.69E-01	6.71E+00	<1	1.86E+01	<1
Selenium	1.83E+00	0.00E+00	1.08E-01	0.00E+00	1.08E-01	0.00E+00	0.00E+00	1.08E-01	2.90E-01	<1	8.20E-01	<1
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.89E+00	0.00E+00	5.96E-04	0.00E+00	5.96E-04	0.00E+00	0.00E+00	5.96E-04	3.50E-01	<1	3.50E+00	<1
Vanadium	1.10E+02	1.80E-02	4.35E-01	0.00E+00	4.35E-01	2.84E-03	0.00E+00	4.38E-01	3.44E-01	1.27E+00	1.70E+00	<1
Zinc	3.42E+02	5.37E-01	4.53E+00	0.00E+00	4.53E+00	8.46E-02	0.00E+00	4.62E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	1.20E-03	0.00E+00	1.20E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	2.24E+01	2.16E+00	0.00E+00	2.16E+00	3.53E+00	0.00E+00	5.69E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	8.19E+01	0.00E+00	5.91E+00	0.00E+00	5.91E+00	0.00E+00	0.00E+00	5.91E+00				
Acenaphthylene	3.20E-01	0.00E+00	2.47E-02	0.00E+00	2.47E-02	0.00E+00	0.00E+00	2.47E-02				
Anthracene	1.13E+02	0.00E+00	7.79E+00	0.00E+00	7.79E+00	0.00E+00	0.00E+00	7.79E+00				
Fluoranthene	2.24E+03	9.30E-03	1.47E+02	0.00E+00	1.47E+02	1.47E-03	0.00E+00	1.47E+02				
Fluorene	2.57E+01	0.00E+00	1.82E+00	0.00E+00	1.82E+00	0.00E+00	0.00E+00	1.82E+00				
Naphthalene	3.65E+00	0.00E+00	2.79E-01	0.00E+00	2.79E-01	0.00E+00	0.00E+00	2.79E-01				
Phenanthrene	2.85E+02	0.00E+00	1.96E+01	0.00E+00	1.96E+01	0.00E+00	0.00E+00	1.96E+01				
Total LMW PAHs					1.82E+02	1.47E-03	0.00E+00	1.82E+02	1.61E+01	1.13E+01	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.12E+03	3.00E-03	6.37E+01	0.00E+00	6.37E+01	4.73E-04	0.00E+00	6.37E+01				
Benzo(A)Pyrene	1.27E+03	3.90E+00	7.62E+01	0.00E+00	7.62E+01	6.15E-01	0.00E+00	7.68E+01				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	5.94E+01	0.00E+00	5.94E+01	1.58E-03	0.00E+00	5.94E+01				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	4.05E+01	0.00E+00	4.05E+01	6.15E-04	0.00E+00	4.05E+01				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	4.25E+01	0.00E+00	4.25E+01	0.00E+00	0.00E+00	4.25E+01				
Chrysene	1.17E+03	7.60E-03	7.25E+01	0.00E+00	7.25E+01	1.20E-03	0.00E+00	7.25E+01				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	1.35E+01	0.00E+00	1.35E+01	0.00E+00	0.00E+00	1.35E+01				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	3.66E+01	0.00E+00	3.66E+01	4.89E-04	0.00E+00	3.66E+01				
Pyrene	1.96E+03	7.00E-03	1.31E+02	0.00E+00	1.31E+02	1.10E-03	0.00E+00	1.31E+02				
Total HMW PAHs					5.36E+02	6.20E-01	0.00E+00	5.36E+02	2.00E+00	2.68E+02	2.00E+01	2.68E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H21-5
Refined Exposure Evaluation - Belted Kingfisher
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-6
Refined Exposure Evaluation - Mourning Dove
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-01	0.00E+00	9.85E-01	1.10E+02	<1	1.10E+03	<1
Antimony	9.30E-01	0.00E+00	4.21E-03	0.00E+00	0.00E+00	4.21E-03	0.00E+00	7.22E-03	1.14E-02	No TRV	--	No TRV	--
Arsenic	1.35E+01	0.00E+00	5.80E-02	0.00E+00	0.00E+00	5.80E-02	0.00E+00	1.05E-01	1.63E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.45E+02	2.34E-01	4.35E+00	0.00E+00	0.00E+00	4.35E+00	2.67E-02	1.90E+00	6.28E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	3.99E+00	7.10E-04	1.85E-01	0.00E+00	0.00E+00	1.85E-01	8.10E-05	3.10E-02	2.16E-01	No TRV	--	No TRV	--
Cadmium	3.62E+00	3.00E-03	1.43E-01	0.00E+00	0.00E+00	1.43E-01	3.42E-04	2.81E-02	1.72E-01	1.47E+00	<1	6.35E+00	<1
Chromium	2.87E+01	0.00E+00	1.34E-01	0.00E+00	0.00E+00	1.34E-01	0.00E+00	2.23E-01	3.57E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	9.47E+00	0.00E+00	8.11E-03	0.00E+00	0.00E+00	8.11E-03	0.00E+00	7.35E-02	8.16E-02	7.61E+00	<1	2.02E+01	<1
Copper	4.43E+01	1.65E-02	9.92E-01	0.00E+00	0.00E+00	9.92E-01	1.88E-03	3.44E-01	1.34E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.11E+02	7.60E-03	4.24E-01	0.00E+00	0.00E+00	4.24E-01	8.67E-04	8.59E-01	1.28E+00	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	6.31E-02	0.00E+00	9.38E-03	0.00E+00	0.00E+00	9.38E-03	0.00E+00	4.90E-04	9.87E-03	4.50E-01	<1	9.10E-01	<1
Nickel	3.60E+02	5.59E-02	1.01E+00	0.00E+00	0.00E+00	1.01E+00	6.38E-03	2.79E+00	3.81E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.83E+00	0.00E+00	1.13E-01	0.00E+00	0.00E+00	1.13E-01	0.00E+00	1.42E-02	1.27E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.89E+00	0.00E+00	8.63E-04	0.00E+00	0.00E+00	8.63E-04	0.00E+00	1.47E-02	1.55E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	1.10E+02	1.80E-02	6.11E-02	0.00E+00	0.00E+00	6.11E-02	2.05E-03	8.57E-01	9.20E-01	3.44E-01	2.67E+00	1.70E+00	<1
Zinc	3.42E+02	5.37E-01	1.40E+01	0.00E+00	0.00E+00	1.40E+01	6.13E-02	2.66E+00	1.67E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.67E-04	3.19E-01	3.20E-01	4.00E-02	8.01E+00	4.00E-01	<1
Fluoride	1.47E+02	2.24E+01	1.00E+00	0.00E+00	0.00E+00	1.00E+00	2.56E+00	1.14E+00	4.70E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	8.19E+01	0.00E+00	1.01E-05	0.00E+00	0.00E+00	1.01E-05	0.00E+00	6.36E-01	6.36E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.13E+02	0.00E+00	1.68E+00	0.00E+00	0.00E+00	1.68E+00	0.00E+00	8.77E-01	2.56E+00				
Fluoranthene	2.24E+03	9.30E-03	1.28E+02	0.00E+00	0.00E+00	1.28E+02	1.06E-03	1.73E+01	1.45E+02				
Fluorene	2.57E+01	0.00E+00	2.73E-05	0.00E+00	0.00E+00	2.73E-05	0.00E+00	1.99E-01	1.99E-01				
Naphthalene	3.65E+00	0.00E+00	5.08E+00	0.00E+00	0.00E+00	5.08E+00	0.00E+00	2.83E-02	5.11E+00				
Phenanthrene	2.85E+02	0.00E+00	3.22E+00	0.00E+00	0.00E+00	3.22E+00	0.00E+00	2.21E+00	5.44E+00				
Total LMW PAHs						1.38E+02	1.06E-03	2.13E+01	1.59E+02	1.61E+01	9.87E+00	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.12E+03	3.00E-03	4.94E-01	0.00E+00	0.00E+00	4.94E-01	3.42E-04	8.69E+00	9.18E+00				
Benzo(A)Pyrene	1.27E+03	3.90E+00	1.54E+01	0.00E+00	0.00E+00	1.54E+01	4.45E-01	9.85E+00	2.57E+01				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	3.55E+01	0.00E+00	0.00E+00	3.55E+01	1.14E-03	7.79E+00	4.33E+01				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	1.04E+02	0.00E+00	0.00E+00	1.04E+02	4.45E-04	5.43E+00	1.10E+02				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	3.77E+00	0.00E+00	0.00E+00	3.77E+00	0.00E+00	5.59E+00	9.36E+00				
Chrysene	1.17E+03	7.60E-03	5.06E-01	0.00E+00	0.00E+00	5.06E-01	8.67E-04	9.05E+00	9.56E+00				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	3.51E+00	0.00E+00	0.00E+00	3.51E+00	0.00E+00	1.84E+00	5.35E+00				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	8.07E+00	0.00E+00	0.00E+00	8.07E+00	3.54E-04	4.99E+00	1.31E+01				
Pyrene	1.96E+03	7.00E-03	1.61E+02	0.00E+00	0.00E+00	1.61E+02	7.99E-04	1.52E+01	1.77E+02				
Total HMW PAHs						3.33E+02	4.49E-01	6.85E+01	4.02E+02	2.00E+00	2.01E+02	2.00E+01	2.01E+01

Table H21-6
Refined Exposure Evaluation - Mourning Dove
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	4.89E-04	0.00E+00	0.00E+00	4.89E-04	0.00E+00	1.40E-03	1.89E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	7.70E+00	0.00E+00	1.65E+00	0.00E+00	0.00E+00	1.65E+00	0.00E+00	5.98E-02	1.71E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-7
Refined Exposure Evaluation - Red-tailed Hawk
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-01	0.00E+00	7.08E-01	1.10E+02	<1	1.10E+03	<1
Antimony	9.30E-01	0.00E+00	0.00E+00	0.00E+00	3.81E-03	3.81E-03	0.00E+00	1.98E-03	5.80E-03	No TRV	--	No TRV	--
Arsenic	1.35E+01	0.00E+00	0.00E+00	0.00E+00	5.44E-03	5.44E-03	0.00E+00	2.89E-02	3.43E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.45E+02	2.34E-01	0.00E+00	0.00E+00	1.37E-02	1.37E-02	1.92E-02	5.21E-01	5.54E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	3.99E+00	7.10E-04	0.00E+00	0.00E+00	7.37E-04	7.37E-04	5.82E-05	8.52E-03	9.31E-03	No TRV	--	No TRV	--
Cadmium	3.62E+00	3.00E-03	0.00E+00	0.00E+00	4.28E-02	4.28E-02	2.46E-04	7.72E-03	5.08E-02	1.47E+00	<1	6.35E+00	<1
Chromium	2.87E+01	0.00E+00	0.00E+00	0.00E+00	2.24E-01	2.24E-01	0.00E+00	6.12E-02	2.85E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	9.47E+00	0.00E+00	0.00E+00	0.00E+00	1.78E-02	1.78E-02	0.00E+00	2.02E-02	3.80E-02	7.61E+00	<1	2.02E+01	<1
Copper	4.43E+01	1.65E-02	0.00E+00	0.00E+00	1.09E+00	1.09E+00	1.35E-03	9.45E-02	1.19E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.11E+02	7.60E-03	0.00E+00	0.00E+00	7.09E-01	7.09E-01	6.23E-04	2.36E-01	9.46E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	6.31E-02	0.00E+00	0.00E+00	0.00E+00	1.97E-03	1.97E-03	0.00E+00	1.35E-04	2.11E-03	4.50E-01	<1	9.10E-01	<1
Nickel	3.60E+02	5.59E-02	0.00E+00	0.00E+00	9.94E-01	9.94E-01	4.58E-03	7.67E-01	1.77E+00	6.71E+00	<1	1.86E+01	<1
Selenium	1.83E+00	0.00E+00	0.00E+00	0.00E+00	6.79E-02	6.79E-02	0.00E+00	3.89E-03	7.18E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.89E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-02	1.68E-02	0.00E+00	4.03E-03	2.08E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	1.10E+02	1.80E-02	0.00E+00	0.00E+00	1.11E-01	1.11E-01	1.48E-03	2.35E-01	3.48E-01	3.44E-01	1.01E+00	1.70E+00	<1
Zinc	3.42E+02	5.37E-01	0.00E+00	0.00E+00	9.72E+00	9.72E+00	4.40E-02	7.30E-01	1.05E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	8.77E-02	8.84E-02	4.00E-02	2.21E+00	4.00E-01	<1
Fluoride	1.47E+02	2.24E+01	0.00E+00	0.00E+00	1.92E-01	1.92E-01	1.84E+00	3.13E-01	2.34E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	8.19E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-01	1.75E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.13E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-01	2.41E-01				
Fluoranthene	2.24E+03	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.63E-04	4.77E+00	4.77E+00				
Fluorene	2.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-02	5.48E-02				
Naphthalene	3.65E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.78E-03	7.78E-03				
Phenanthrene	2.85E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.08E-01	6.08E-01				
Total LMW PAHs						0.00E+00	7.63E-04	5.85E+00	5.85E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.12E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-04	2.39E+00	2.39E+00				
Benzo(A)Pyrene	1.27E+03	3.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-01	2.71E+00	3.03E+00				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-04	2.14E+00	2.14E+00				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.20E-04	1.49E+00	1.49E+00				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E+00	1.54E+00				
Chrysene	1.17E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.23E-04	2.49E+00	2.49E+00				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.05E-01	5.05E-01				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-04	1.37E+00	1.37E+00				
Pyrene	1.96E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-04	4.19E+00	4.19E+00				
Total HMW PAHs						0.00E+00	3.23E-01	1.88E+01	1.91E+01	2.00E+00	9.57E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	0.00E+00	0.00E+00	1.15E-02	1.15E-02	0.00E+00	3.84E-04	1.19E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	7.70E+00	0.00E+00	0.00E+00	0.00E+00	3.54E-02	3.54E-02	0.00E+00	1.64E-02	5.18E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H21-7
Refined Exposure Evaluation - Red-tailed Hawk
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E+00	0.00E+00	1.37E+00	1.10E+02	<1	1.10E+03	<1
Antimony	9.30E-01	0.00E+00	0.00E+00	1.47E-01	0.00E+00	1.47E-01	0.00E+00	0.00E+00	1.47E-01	No TRV	--	No TRV	--
Arsenic	1.35E+01	0.00E+00	0.00E+00	2.41E-01	0.00E+00	2.41E-01	0.00E+00	0.00E+00	2.41E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.45E+02	2.34E-01	0.00E+00	3.52E+00	0.00E+00	3.52E+00	3.70E-02	0.00E+00	3.56E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	3.99E+00	7.10E-04	0.00E+00	2.85E-02	0.00E+00	2.85E-02	1.12E-04	0.00E+00	2.86E-02	No TRV	--	No TRV	--
Cadmium	3.62E+00	3.00E-03	0.00E+00	3.65E+00	0.00E+00	3.65E+00	4.75E-04	0.00E+00	3.65E+00	1.47E+00	2.48E+00	6.35E+00	<1
Chromium	2.87E+01	0.00E+00	0.00E+00	1.39E+00	0.00E+00	1.39E+00	0.00E+00	0.00E+00	1.39E+00	2.66E+00	<1	1.56E+01	<1
Cobalt	9.47E+00	0.00E+00	0.00E+00	1.83E-01	0.00E+00	1.83E-01	0.00E+00	0.00E+00	1.83E-01	7.61E+00	<1	2.02E+01	<1
Copper	4.43E+01	1.65E-02	0.00E+00	3.61E+00	0.00E+00	3.61E+00	2.61E-03	0.00E+00	3.62E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.11E+02	7.60E-03	0.00E+00	5.68E+00	0.00E+00	5.68E+00	1.20E-03	0.00E+00	5.68E+00	1.63E+00	3.49E+00	4.46E+01	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	6.31E-02	0.00E+00	0.00E+00	3.93E-02	0.00E+00	3.93E-02	0.00E+00	0.00E+00	3.93E-02	4.50E-01	<1	9.10E-01	<1
Nickel	3.60E+02	5.59E-02	0.00E+00	4.43E+01	0.00E+00	4.43E+01	8.85E-03	0.00E+00	4.43E+01	6.71E+00	6.61E+00	1.86E+01	2.38E+00
Selenium	1.83E+00	0.00E+00	0.00E+00	2.28E-01	0.00E+00	2.28E-01	0.00E+00	0.00E+00	2.28E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	1.89E+00	0.00E+00	0.00E+00	1.62E-02	0.00E+00	1.62E-02	0.00E+00	0.00E+00	1.62E-02	3.50E-01	<1	3.50E+00	<1
Vanadium	1.10E+02	1.80E-02	0.00E+00	7.34E-01	0.00E+00	7.34E-01	2.85E-03	0.00E+00	7.37E-01	3.44E-01	2.14E+00	1.70E+00	<1
Zinc	3.42E+02	5.37E-01	0.00E+00	9.18E+01	0.00E+00	9.18E+01	8.50E-02	0.00E+00	9.19E+01	6.61E+01	1.39E+00	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-03	0.00E+00	1.20E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	1.47E+02	2.24E+01	0.00E+00	2.88E+00	0.00E+00	2.88E+00	3.55E+00	0.00E+00	6.43E+00	1.22E+01	<1	1.22E+02	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	8.19E+01	0.00E+00	0.00E+00	1.91E+01	0.00E+00	1.91E+01	0.00E+00	0.00E+00	1.91E+01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.13E+02	0.00E+00	0.00E+00	4.33E+01	0.00E+00	4.33E+01	0.00E+00	0.00E+00	4.33E+01				
Fluoranthene	2.24E+03	9.30E-03	0.00E+00	1.08E+03	0.00E+00	1.08E+03	1.47E-03	0.00E+00	1.08E+03				
Fluorene	2.57E+01	0.00E+00	0.00E+00	3.89E+01	0.00E+00	3.89E+01	0.00E+00	0.00E+00	3.89E+01				
Naphthalene	3.65E+00	0.00E+00	0.00E+00	2.54E+00	0.00E+00	2.54E+00	0.00E+00	0.00E+00	2.54E+00				
Phenanthrene	2.85E+02	0.00E+00	0.00E+00	7.77E+01	0.00E+00	7.77E+01	0.00E+00	0.00E+00	7.77E+01				
Total LMW PAHs						1.26E+03	1.47E-03	0.00E+00	1.26E+03	1.61E+01	7.81E+01	1.61E+02	7.81E+00
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.12E+03	3.00E-03	0.00E+00	2.82E+02	0.00E+00	2.82E+02	4.75E-04	0.00E+00	2.82E+02				
Benzo(A)Pyrene	1.27E+03	3.90E+00	0.00E+00	2.67E+02	0.00E+00	2.67E+02	6.17E-01	0.00E+00	2.68E+02				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	0.00E+00	4.13E+02	0.00E+00	4.13E+02	1.58E-03	0.00E+00	4.13E+02				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	0.00E+00	3.26E+02	0.00E+00	3.26E+02	6.17E-04	0.00E+00	3.26E+02				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	0.00E+00	2.96E+02	0.00E+00	2.96E+02	0.00E+00	0.00E+00	2.96E+02				
Chrysene	1.17E+03	7.60E-03	0.00E+00	4.23E+02	0.00E+00	4.23E+02	1.20E-03	0.00E+00	4.23E+02				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	0.00E+00	8.65E+01	0.00E+00	8.65E+01	0.00E+00	0.00E+00	8.65E+01				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	0.00E+00	2.91E+02	0.00E+00	2.91E+02	4.91E-04	0.00E+00	2.91E+02				
Pyrene	1.96E+03	7.00E-03	0.00E+00	5.44E+02	0.00E+00	5.44E+02	1.11E-03	0.00E+00	5.44E+02				
Total HMW PAHs						2.93E+03	6.23E-01	0.00E+00	2.93E+03	2.00E+00	1.46E+03	2.00E+01	1.46E+02
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	0.00E+00	1.55E+00	0.00E+00	1.55E+00	0.00E+00	0.00E+00	1.55E+00	1.10E+00	1.41E+00	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	7.70E+00	0.00E+00	0.00E+00	8.49E+00	0.00E+00	8.49E+00	0.00E+00	0.00E+00	8.49E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H21-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-9
Refined Exposure Evaluation - Canada Lynx
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.70E-01	0.00E+00	2.70E-01	No TRV	--	No TRV	--
Antimony	9.30E-01	0.00E+00	0.00E+00	0.00E+00	1.45E-03	1.45E-03	0.00E+00	8.14E-04	2.27E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.35E+01	0.00E+00	0.00E+00	0.00E+00	2.07E-03	2.07E-03	0.00E+00	1.19E-02	1.39E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.45E+02	2.34E-01	0.00E+00	0.00E+00	5.22E-03	5.22E-03	7.31E-03	2.14E-01	2.26E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	3.99E+00	7.10E-04	0.00E+00	0.00E+00	2.81E-04	2.81E-04	2.22E-05	3.49E-03	3.80E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	3.62E+00	3.00E-03	0.00E+00	0.00E+00	1.63E-02	1.63E-02	9.37E-05	3.17E-03	1.96E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.87E+01	0.00E+00	0.00E+00	0.00E+00	8.52E-02	8.52E-02	0.00E+00	2.51E-02	1.10E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	9.47E+00	0.00E+00	0.00E+00	0.00E+00	6.78E-03	6.78E-03	0.00E+00	8.29E-03	1.51E-02	7.33E+00	<1	1.89E+01	<1
Copper	4.43E+01	1.65E-02	0.00E+00	0.00E+00	4.16E-01	4.16E-01	5.16E-04	3.88E-02	4.56E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.11E+02	7.60E-03	0.00E+00	0.00E+00	2.70E-01	2.70E-01	2.37E-04	9.68E-02	3.67E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	6.31E-02	0.00E+00	0.00E+00	0.00E+00	7.52E-04	7.52E-04	0.00E+00	5.52E-05	8.07E-04	1.41E+00	<1	1.41E+01	<1
Nickel	3.60E+02	5.59E-02	0.00E+00	0.00E+00	3.79E-01	3.79E-01	1.75E-03	3.15E-01	6.95E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.83E+00	0.00E+00	0.00E+00	0.00E+00	2.59E-02	2.59E-02	0.00E+00	1.60E-03	2.75E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.89E+00	0.00E+00	0.00E+00	0.00E+00	6.39E-03	6.39E-03	0.00E+00	1.65E-03	8.05E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.10E+02	1.80E-02	0.00E+00	0.00E+00	4.24E-02	4.24E-02	5.62E-04	9.65E-02	1.40E-01	4.16E+00	<1	9.44E+00	<1
Zinc	3.42E+02	5.37E-01	0.00E+00	0.00E+00	3.70E+00	3.70E+00	1.68E-02	3.00E-01	4.02E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	3.60E-02	3.62E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	1.47E+02	2.24E+01	0.00E+00	0.00E+00	7.33E-02	7.33E-02	7.00E-01	1.28E-01	9.01E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	8.19E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.16E-02	7.16E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.13E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.89E-02	9.89E-02				
Fluoranthene	2.24E+03	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-04	1.96E+00	1.96E+00				
Fluorene	2.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-02	2.25E-02				
Naphthalene	3.65E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-03	3.19E-03				
Phenanthrene	2.85E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-01	2.50E-01				
Total LMW PAHs						0.00E+00	2.91E-04	2.40E+00	2.40E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	1.12E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-05	9.79E-01	9.79E-01				
Benzo(A)Pyrene	1.27E+03	3.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-01	1.11E+00	1.23E+00				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-04	8.78E-01	8.79E-01				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-04	6.12E-01	6.12E-01				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.30E-01	6.30E-01				
Chrysene	1.17E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-04	1.02E+00	1.02E+00				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.07E-01	2.07E-01				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-05	5.63E-01	5.63E-01				
Pyrene	1.96E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-04	1.72E+00	1.72E+00				
Total HMW PAHs						0.00E+00	1.23E-01	7.72E+00	7.84E+00	6.15E-01	1.28E+01	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	0.00E+00	0.00E+00	4.38E-03	4.38E-03	0.00E+00	1.57E-04	4.54E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	7.70E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-02	1.35E-02	0.00E+00	6.74E-03	2.02E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-9
Refined Exposure Evaluation - Canada Lynx
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-10
Refined Exposure Evaluation - Grizzly Bear
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-01	0.00E+00	1.86E-01	No TRV	--	No TRV	--
Antimony	9.30E-01	0.00E+00	5.17E-04	3.01E-03	1.00E-04	0.00E+00	3.63E-03	0.00E+00	5.62E-04	4.19E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.35E+01	0.00E+00	7.14E-03	4.93E-03	1.43E-04	0.00E+00	1.22E-02	0.00E+00	8.19E-03	2.04E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.45E+02	2.34E-01	5.36E-01	7.21E-02	3.60E-04	0.00E+00	6.08E-01	5.05E-03	1.48E-01	7.61E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	3.99E+00	7.10E-04	2.27E-02	5.82E-04	1.94E-05	0.00E+00	2.33E-02	1.53E-05	2.42E-03	2.57E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	3.62E+00	3.00E-03	1.76E-02	7.46E-02	1.13E-03	0.00E+00	9.33E-02	6.48E-05	2.19E-03	9.56E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.87E+01	0.00E+00	1.65E-02	2.85E-02	5.89E-03	0.00E+00	5.09E-02	0.00E+00	1.74E-02	6.82E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	9.47E+00	0.00E+00	9.97E-04	3.74E-03	4.68E-04	0.00E+00	5.21E-03	0.00E+00	5.73E-03	1.09E-02	7.33E+00	<1	1.89E+01	<1
Copper	4.43E+01	1.65E-02	1.22E-01	7.39E-02	2.88E-02	0.00E+00	2.25E-01	3.56E-04	2.68E-02	2.52E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.11E+02	7.60E-03	5.22E-02	1.16E-01	1.87E-02	0.00E+00	1.87E-01	1.64E-04	6.69E-02	2.54E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	6.31E-02	0.00E+00	1.15E-03	8.04E-04	5.19E-05	0.00E+00	2.01E-03	0.00E+00	3.82E-05	2.05E-03	1.41E+00	<1	1.41E+01	<1
Nickel	3.60E+02	5.59E-02	1.24E-01	9.07E-01	2.62E-02	0.00E+00	1.06E+00	1.21E-03	2.18E-01	1.28E+00	1.70E+00	<1	1.48E+01	<1
Selenium	1.83E+00	0.00E+00	1.39E-02	4.67E-03	1.79E-03	0.00E+00	2.03E-02	0.00E+00	1.10E-03	2.14E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.89E+00	0.00E+00	1.06E-04	3.31E-04	4.42E-04	0.00E+00	8.79E-04	0.00E+00	1.14E-03	2.02E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	1.10E+02	1.80E-02	7.51E-03	1.50E-02	2.93E-03	0.00E+00	2.55E-02	3.89E-04	6.67E-02	9.26E-02	4.16E+00	<1	9.44E+00	<1
Zinc	3.42E+02	5.37E-01	1.72E+00	1.88E+00	2.56E-01	0.00E+00	3.85E+00	1.16E-02	2.07E-01	4.07E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-04	2.49E-02	2.50E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	1.47E+02	2.24E+01	1.24E-01	5.89E-02	5.07E-03	0.00E+00	1.87E-01	4.84E-01	8.87E-02	7.60E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	8.19E+01	0.00E+00	1.24E-06	3.90E-01	0.00E+00	0.00E+00	3.90E-01	0.00E+00	4.95E-02	4.39E-01				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	1.13E+02	0.00E+00	2.07E-01	8.86E-01	0.00E+00	0.00E+00	1.09E+00	0.00E+00	6.83E-02	1.16E+00				
Fluoranthene	2.24E+03	9.30E-03	1.57E+01	2.20E+01	0.00E+00	0.00E+00	3.77E+01	2.01E-04	1.35E+00	3.91E+01				
Fluorene	2.57E+01	0.00E+00	3.35E-06	7.97E-01	0.00E+00	0.00E+00	7.97E-01	0.00E+00	1.55E-02	8.12E-01				
Naphthalene	3.65E+00	0.00E+00	6.25E-01	5.20E-02	0.00E+00	0.00E+00	6.77E-01	0.00E+00	2.21E-03	6.79E-01				
Phenanthrene	2.85E+02	0.00E+00	3.96E-01	1.59E+00	0.00E+00	0.00E+00	1.99E+00	0.00E+00	1.72E-01	2.16E+00				
Total LMW PAHs							4.26E+01	2.01E-04	1.66E+00	4.43E+01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	1.12E+03	3.00E-03	6.08E-02	5.76E+00	0.00E+00	0.00E+00	5.83E+00	6.48E-05	6.77E-01	6.50E+00				
Benzo[A]Pyrene	1.27E+03	3.90E+00	1.90E+00	5.47E+00	0.00E+00	0.00E+00	7.36E+00	8.42E-02	7.67E-01	8.22E+00				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	4.37E+00	8.46E+00	0.00E+00	0.00E+00	1.28E+01	2.16E-04	6.07E-01	1.34E+01				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	1.28E+01	6.66E+00	0.00E+00	0.00E+00	1.95E+01	8.42E-05	4.23E-01	1.99E+01				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	4.64E-01	6.07E+00	0.00E+00	0.00E+00	6.53E+00	0.00E+00	4.35E-01	6.96E+00				
Chrysene	1.17E+03	7.60E-03	6.23E-02	8.65E+00	0.00E+00	0.00E+00	8.71E+00	1.64E-04	7.05E-01	9.42E+00				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	4.32E-01	1.77E+00	0.00E+00	0.00E+00	2.20E+00	0.00E+00	1.43E-01	2.35E+00				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	9.93E-01	5.96E+00	0.00E+00	0.00E+00	6.95E+00	6.69E-05	3.89E-01	7.34E+00				
Pyrene	1.96E+03	7.00E-03	1.99E+01	1.11E+01	0.00E+00	0.00E+00	3.10E+01	1.51E-04	1.19E+00	3.22E+01				
Total HMW PAHs							1.01E+02	8.50E-02	5.33E+00	1.06E+02	6.15E-01	1.73E+02	3.84E+01	2.77E+00
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.80E-01	0.00E+00	6.01E-05	3.17E-02	3.03E-04	0.00E+00	3.21E-02	0.00E+00	1.09E-04	3.22E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	7.70E+00	0.00E+00	2.03E-01	1.74E-01	9.32E-04	0.00E+00	3.78E-01	0.00E+00	4.66E-03	3.82E-01	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-10
Refined Exposure Evaluation - Grizzly Bear
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-11
Refined Exposure Evaluation - Long-tailed Weasel
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{Low}	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.44E-01	0.00E+00	4.44E-01	No TRV	--	No TRV	--
Antimony	6.04E-01	0.00E+00	0.00E+00	0.00E+00	1.56E-03	1.56E-03	0.00E+00	4.98E-04	2.05E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.46E+01	0.00E+00	0.00E+00	0.00E+00	3.62E-03	3.62E-03	0.00E+00	1.20E-02	1.56E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.73E+02	2.34E-01	0.00E+00	0.00E+00	1.66E-02	1.66E-02	1.20E-02	3.90E-01	4.18E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.46E+00	7.10E-04	0.00E+00	0.00E+00	7.48E-04	7.48E-04	3.65E-05	5.32E-03	6.11E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	3.05E+00	3.00E-03	0.00E+00	0.00E+00	2.48E-02	2.48E-02	1.54E-04	2.51E-03	2.74E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.32E+01	0.00E+00	0.00E+00	0.00E+00	1.20E-01	1.20E-01	0.00E+00	1.91E-02	1.39E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	7.37E+00	0.00E+00	0.00E+00	0.00E+00	8.05E-03	8.05E-03	0.00E+00	6.07E-03	1.41E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.66E+01	1.65E-02	0.00E+00	0.00E+00	6.37E-01	6.37E-01	8.49E-04	2.19E-02	6.60E-01	5.60E+00	<1	8.27E+01	<1
Lead	9.67E+01	7.60E-03	0.00E+00	0.00E+00	4.19E-01	4.19E-01	3.91E-04	7.96E-02	4.99E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	3.13E-02	0.00E+00	0.00E+00	0.00E+00	6.13E-04	6.13E-04	0.00E+00	2.58E-05	6.39E-04	1.41E+00	<1	1.41E+01	<1
Nickel	3.26E+02	5.59E-02	0.00E+00	0.00E+00	5.96E-01	5.96E-01	2.88E-03	2.69E-01	8.68E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.13E+00	0.00E+00	0.00E+00	0.00E+00	3.55E-02	3.55E-02	0.00E+00	9.30E-04	3.65E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.99E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-02	1.11E-02	0.00E+00	1.64E-03	1.27E-02	4.80E-01	<1	1.43E+00	<1
Vanadium	7.64E+01	1.80E-02	0.00E+00	0.00E+00	4.84E-02	4.84E-02	9.26E-04	6.29E-02	1.12E-01	4.16E+00	<1	9.44E+00	<1
Zinc	2.45E+02	5.37E-01	0.00E+00	0.00E+00	5.96E+00	5.96E+00	2.76E-02	2.02E-01	6.19E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.45E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	3.66E-02	3.70E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	1.10E+02	2.24E+01	0.00E+00	0.00E+00	9.04E-02	9.04E-02	1.15E+00	9.04E-02	1.33E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-02	2.05E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.90E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.04E-02	4.04E-02				
Fluoranthene	6.10E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.79E-04	5.02E-01	5.02E-01				
Fluorene	1.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-02	1.07E-02				
Naphthalene	2.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.97E-03	1.97E-03				
Phenanthrene	2.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.65E-01	1.65E-01				
Total LMW PAHs						0.00E+00	4.79E-04	7.41E-01	7.41E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.11E+02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	2.56E-01	2.56E-01				
Benzo(A)Pyrene	3.40E+02	3.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-01	2.80E-01	4.81E-01				
Benzo(b)fluoranthene	5.22E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-04	4.30E-01	4.30E-01				
Benzo(g,h,i)perylene	2.46E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-04	2.02E-01	2.03E-01				
Benzo(k)fluoranthene	3.44E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-01	2.83E-01				
Chrysene	3.58E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.91E-04	2.95E-01	2.95E-01				
Dibenz(A,H)Anthracene	1.17E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.66E-02	9.66E-02				
Indeno (1,2,3-CD) Pyrene	2.25E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-04	1.85E-01	1.86E-01				
Pyrene	5.21E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	4.29E-01	4.29E-01				
Total HMW PAHs						0.00E+00	2.02E-01	2.46E+00	2.66E+00	6.15E-01	4.32E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-01	1.83E-01	0.00E+00	3.77E-03	1.87E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	4.72E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-02	1.36E-02	0.00E+00	3.88E-03	1.75E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-11
Refined Exposure Evaluation - Long-tailed Weasel
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{Low}	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-12
Refined Exposure Evaluation - Meadow Vole
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E+00	0.00E+00	1.30E+00	No TRV	--	No TRV	--
Antimony	6.04E-01	0.00E+00	3.69E-03	0.00E+00	0.00E+00	3.69E-03	0.00E+00	1.18E-03	4.88E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.46E+01	0.00E+00	8.21E-02	0.00E+00	0.00E+00	8.21E-02	0.00E+00	2.85E-02	1.11E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.73E+02	2.34E-01	1.11E+01	0.00E+00	0.00E+00	1.11E+01	3.52E-02	9.24E-01	1.20E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.46E+00	7.10E-04	3.46E-01	0.00E+00	0.00E+00	3.46E-01	1.07E-04	1.26E-02	3.59E-01	5.32E-01	<1	6.70E-01	<1
Cadmium	3.05E+00	3.00E-03	1.72E-01	0.00E+00	0.00E+00	1.72E-01	4.51E-04	5.95E-03	1.78E-01	7.70E-01	<1	6.87E+00	<1
Chromium	2.32E+01	0.00E+00	1.43E-01	0.00E+00	0.00E+00	1.43E-01	0.00E+00	4.53E-02	1.88E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	7.37E+00	0.00E+00	8.31E-03	0.00E+00	0.00E+00	8.31E-03	0.00E+00	1.44E-02	2.27E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.66E+01	1.65E-02	1.07E+00	0.00E+00	0.00E+00	1.07E+00	2.48E-03	5.20E-02	1.12E+00	5.60E+00	<1	8.27E+01	<1
Lead	9.67E+01	7.60E-03	5.17E-01	0.00E+00	0.00E+00	5.17E-01	1.14E-03	1.89E-01	7.07E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	3.13E-02	0.00E+00	8.43E-03	0.00E+00	0.00E+00	8.43E-03	0.00E+00	6.11E-05	8.49E-03	1.41E+00	<1	1.41E+01	<1
Nickel	3.26E+02	5.59E-02	1.24E+00	0.00E+00	0.00E+00	1.24E+00	8.40E-03	6.38E-01	1.88E+00	1.70E+00	1.11E+00	1.48E+01	<1
Selenium	1.13E+00	0.00E+00	8.73E-02	0.00E+00	0.00E+00	8.73E-02	0.00E+00	2.21E-03	8.95E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.99E+00	0.00E+00	1.19E-03	0.00E+00	0.00E+00	1.19E-03	0.00E+00	3.88E-03	5.07E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	7.64E+01	1.80E-02	5.57E-02	0.00E+00	0.00E+00	5.57E-02	2.70E-03	1.49E-01	2.08E-01	4.16E+00	<1	9.44E+00	<1
Zinc	2.45E+02	5.37E-01	1.53E+01	0.00E+00	0.00E+00	1.53E+01	8.07E-02	4.79E-01	1.59E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.45E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-03	8.69E-02	8.81E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	1.10E+02	2.24E+01	9.90E-01	0.00E+00	0.00E+00	9.90E-01	3.37E+00	2.14E-01	4.57E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.49E+01	0.00E+00	3.68E-05	0.00E+00	0.00E+00	3.68E-05	0.00E+00	4.87E-02	4.87E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.90E+01	0.00E+00	1.16E+00	0.00E+00	0.00E+00	1.16E+00	0.00E+00	9.58E-02	1.25E+00				
Fluoranthene	6.10E+02	9.30E-03	4.58E+01	0.00E+00	0.00E+00	4.58E+01	1.40E-03	1.19E+00	4.70E+01				
Fluorene	1.30E+01	0.00E+00	6.42E-05	0.00E+00	0.00E+00	6.42E-05	0.00E+00	2.54E-02	2.55E-02				
Naphthalene	2.39E+00	0.00E+00	4.38E+00	0.00E+00	0.00E+00	4.38E+00	0.00E+00	4.67E-03	4.39E+00				
Phenanthrene	2.00E+02	0.00E+00	3.41E+00	0.00E+00	0.00E+00	3.41E+00	0.00E+00	3.91E-01	3.80E+00				
Total LMW PAHs						5.47E+01	1.40E-03	1.76E+00	5.65E+01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.11E+02	3.00E-03	3.04E-01	0.00E+00	0.00E+00	3.04E-01	4.51E-04	6.07E-01	9.11E-01				
Benzo(A)Pyrene	3.40E+02	3.90E+00	5.62E+00	0.00E+00	0.00E+00	5.62E+00	5.86E-01	6.64E-01	6.87E+00				
Benzo(b)fluoranthene	5.22E+02	1.00E-02	2.43E+01	0.00E+00	0.00E+00	2.43E+01	1.50E-03	1.02E+00	2.53E+01				
Benzo(g,h,i)perylene	2.46E+02	3.90E-03	3.98E+01	0.00E+00	0.00E+00	3.98E+01	5.86E-04	4.80E-01	4.03E+01				
Benzo(k)fluoranthene	3.44E+02	0.00E+00	2.63E+00	0.00E+00	0.00E+00	2.63E+00	0.00E+00	6.71E-01	3.30E+00				
Chrysene	3.58E+02	7.60E-03	3.30E-01	0.00E+00	0.00E+00	3.30E-01	1.14E-03	7.00E-01	1.03E+00				
Dibenz(A,H)Anthracene	1.17E+02	0.00E+00	2.29E+00	0.00E+00	0.00E+00	2.29E+00	0.00E+00	2.29E-01	2.52E+00				
Indeno (1,2,3-CD) Pyrene	2.25E+02	3.10E-03	3.72E+00	0.00E+00	0.00E+00	3.72E+00	4.66E-04	4.40E-01	4.16E+00				
Pyrene	5.21E+02	7.00E-03	5.63E+01	0.00E+00	0.00E+00	5.63E+01	1.05E-03	1.02E+00	5.73E+01				
Total HMW PAHs						1.35E+02	5.91E-01	5.83E+00	1.42E+02	6.15E-01	2.31E+02	3.84E+01	3.692155648
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	1.64E-02	0.00E+00	0.00E+00	1.64E-02	0.00E+00	8.94E-03	2.53E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	4.72E+00	0.00E+00	1.33E+00	0.00E+00	0.00E+00	1.33E+00	0.00E+00	9.21E-03	1.34E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-12
Refined Exposure Evaluation - Meadow Vole
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-13
Refined Exposure Evaluation - Mink
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	3.73E-01	0.00E+00	3.73E-01	No TRV	--	No TRV	--
Antimony	9.30E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	1.35E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	2.45E+02	2.34E-01	0.00E+00	0.00E+00	0.00E+00	1.01E-02	0.00E+00	1.01E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	3.99E+00	7.10E-04	0.00E+00	0.00E+00	0.00E+00	3.07E-05	0.00E+00	3.07E-05	5.32E-01	<1	6.70E-01	<1
Cadmium	3.62E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	1.30E-04	0.00E+00	1.30E-04	7.70E-01	<1	6.87E+00	<1
Chromium	2.87E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	4.43E+01	1.65E-02	0.00E+00	0.00E+00	0.00E+00	7.14E-04	0.00E+00	7.14E-04	5.60E+00	<1	8.27E+01	<1
Lead	1.11E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-04	0.00E+00	3.29E-04	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.60E+02	5.59E-02	0.00E+00	0.00E+00	0.00E+00	2.42E-03	0.00E+00	2.42E-03	1.70E+00	<1	1.48E+01	<1
Selenium	1.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.10E+02	1.80E-02	0.00E+00	0.00E+00	0.00E+00	7.78E-04	0.00E+00	7.78E-04	4.16E+00	<1	9.44E+00	<1
Zinc	3.42E+02	5.37E-01	0.00E+00	0.00E+00	0.00E+00	2.32E-02	0.00E+00	2.32E-02	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics												
Cyanide	4.12E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-04	0.00E+00	3.29E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	2.24E+01	0.00E+00	0.00E+00	0.00E+00	9.69E-01	0.00E+00	9.69E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	8.19E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	3.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.13E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	2.24E+03	9.30E-03	0.00E+00	0.00E+00	0.00E+00	4.02E-04	0.00E+00	4.02E-04				
Fluorene	2.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	3.65E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.85E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	4.02E-04	0.00E+00	4.02E-04	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	1.12E+03	3.00E-03	0.00E+00	0.00E+00	0.00E+00	1.30E-04	0.00E+00	1.30E-04				
Benzo(A)Pyrene	1.27E+03	3.90E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-01	0.00E+00	1.69E-01				
Benzo(b)fluoranthene	1.00E+03	1.00E-02	0.00E+00	0.00E+00	0.00E+00	4.32E-04	0.00E+00	4.32E-04				
Benzo(g,h,i)perylene	6.99E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	1.69E-04	0.00E+00	1.69E-04				
Benzo(k)fluoranthene	7.20E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	1.17E+03	7.60E-03	0.00E+00	0.00E+00	0.00E+00	3.29E-04	0.00E+00	3.29E-04				
Dibenz(A,H)Anthracene	2.37E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	6.43E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	1.34E-04				
Pyrene	1.96E+03	7.00E-03	0.00E+00	0.00E+00	0.00E+00	3.03E-04	0.00E+00	3.03E-04				
Total HMW PAHs					0.00E+00	1.70E-01	0.00E+00	1.70E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-13
Refined Exposure Evaluation - Mink
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-14
Refined Exposure Evaluation - North American Wolverine
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.59E-01	0.00E+00	2.59E-01	No TRV	--	No TRV	--
Antimony	6.04E-01	0.00E+00	0.00E+00	0.00E+00	9.08E-04	9.08E-04	0.00E+00	5.08E-04	1.42E-03	5.90E-02	<1	2.76E+00	<1
Arsenic	1.46E+01	0.00E+00	0.00E+00	0.00E+00	2.12E-03	2.12E-03	0.00E+00	1.23E-02	1.44E-02	1.04E+00	<1	4.55E+00	<1
Barium	4.73E+02	2.34E-01	0.00E+00	0.00E+00	9.70E-03	9.70E-03	7.03E-03	3.98E-01	4.15E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	6.46E+00	7.10E-04	0.00E+00	0.00E+00	4.37E-04	4.37E-04	2.13E-05	5.44E-03	5.90E-03	5.32E-01	<1	6.70E-01	<1
Cadmium	3.05E+00	3.00E-03	0.00E+00	0.00E+00	1.45E-02	1.45E-02	9.01E-05	2.56E-03	1.71E-02	7.70E-01	<1	6.87E+00	<1
Chromium	2.32E+01	0.00E+00	0.00E+00	0.00E+00	7.01E-02	7.01E-02	0.00E+00	1.95E-02	8.96E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	7.37E+00	0.00E+00	0.00E+00	0.00E+00	4.70E-03	4.70E-03	0.00E+00	6.20E-03	1.09E-02	7.33E+00	<1	1.89E+01	<1
Copper	2.66E+01	1.65E-02	0.00E+00	0.00E+00	3.72E-01	3.72E-01	4.96E-04	2.24E-02	3.95E-01	5.60E+00	<1	8.27E+01	<1
Lead	9.67E+01	7.60E-03	0.00E+00	0.00E+00	2.45E-01	2.45E-01	2.28E-04	8.13E-02	3.26E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	3.13E-02	0.00E+00	0.00E+00	0.00E+00	3.58E-04	3.58E-04	0.00E+00	2.63E-05	3.84E-04	1.41E+00	<1	1.41E+01	<1
Nickel	3.26E+02	5.59E-02	0.00E+00	0.00E+00	3.48E-01	3.48E-01	1.68E-03	2.75E-01	6.24E-01	1.70E+00	<1	1.48E+01	<1
Selenium	1.13E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-02	2.08E-02	0.00E+00	9.50E-04	2.17E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.99E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	6.46E-03	0.00E+00	1.67E-03	8.13E-03	4.80E-01	<1	1.43E+00	<1
Vanadium	7.64E+01	1.80E-02	0.00E+00	0.00E+00	2.82E-02	2.82E-02	5.41E-04	6.43E-02	9.30E-02	4.16E+00	<1	9.44E+00	<1
Zinc	2.45E+02	5.37E-01	0.00E+00	0.00E+00	3.48E+00	3.48E+00	1.61E-02	2.06E-01	3.70E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.45E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	3.74E-02	3.77E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	1.10E+02	2.24E+01	0.00E+00	0.00E+00	5.28E-02	5.28E-02	6.73E-01	9.24E-02	8.18E-01	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-02	2.10E-02				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.90E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.13E-02	4.13E-02				
Fluoranthene	6.10E+02	9.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-04	5.13E-01	5.13E-01				
Fluorene	1.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-02	1.10E-02				
Naphthalene	2.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-03	2.01E-03				
Phenanthrene	2.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.69E-01	1.69E-01				
Total LMW PAHs						0.00E+00	2.79E-04	7.57E-01	7.57E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.11E+02	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-05	2.61E-01	2.61E-01				
Benzo(A)Pyrene	3.40E+02	3.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-01	2.86E-01	4.03E-01				
Benzo(b)fluoranthene	5.22E+02	1.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04	4.39E-01	4.39E-01				
Benzo(g,h,i)perylene	2.46E+02	3.90E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-04	2.07E-01	2.07E-01				
Benzo(k)fluoranthene	3.44E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.89E-01	2.89E-01				
Chrysene	3.58E+02	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-04	3.01E-01	3.02E-01				
Dibenz(A,H)Anthracene	1.17E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E-02	9.87E-02				
Indeno (1,2,3-CD) Pyrene	2.25E+02	3.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-05	1.89E-01	1.90E-01				
Pyrene	5.21E+02	7.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-04	4.38E-01	4.38E-01				
Total HMW PAHs						0.00E+00	1.18E-01	2.51E+00	2.63E+00	6.15E-01	4.27E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-01	1.07E-01	0.00E+00	3.85E-03	1.11E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	4.72E+00	0.00E+00	0.00E+00	0.00E+00	7.94E-03	7.94E-03	0.00E+00	3.97E-03	1.19E-02	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-14
Refined Exposure Evaluation - North American Wolverine
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H21-15
Refined Exposure Evaluation - Short-tailed Shrew
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	8.63E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	0.00E+00	1.16E+00	No TRV	--	No TRV	--
Antimony	6.04E-01	0.00E+00	0.00E+00	8.10E-02	0.00E+00	8.10E-02	0.00E+00	8.91E-04	8.19E-02	5.90E-02	1.39E+00	2.76E+00	<1
Arsenic	1.46E+01	0.00E+00	0.00E+00	2.15E-01	0.00E+00	2.15E-01	0.00E+00	2.15E-02	2.36E-01	1.04E+00	<1	4.55E+00	<1
Barium	4.73E+02	2.34E-01	0.00E+00	5.77E+00	0.00E+00	5.77E+00	3.14E-02	6.97E-01	6.50E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	6.46E+00	7.10E-04	0.00E+00	3.90E-02	0.00E+00	3.90E-02	9.51E-05	9.53E-03	4.86E-02	5.32E-01	<1	6.70E-01	<1
Cadmium	3.05E+00	3.00E-03	0.00E+00	2.69E+00	0.00E+00	2.69E+00	4.02E-04	4.49E-03	2.70E+00	7.70E-01	3.50E+00	6.87E+00	<1
Chromium	2.32E+01	0.00E+00	0.00E+00	9.51E-01	0.00E+00	9.51E-01	0.00E+00	3.42E-02	9.85E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	7.37E+00	0.00E+00	0.00E+00	1.21E-01	0.00E+00	1.21E-01	0.00E+00	1.09E-02	1.31E-01	7.33E+00	<1	1.89E+01	<1
Copper	2.66E+01	1.65E-02	0.00E+00	1.84E+00	0.00E+00	1.84E+00	2.21E-03	3.93E-02	1.88E+00	5.60E+00	<1	8.27E+01	<1
Lead	9.67E+01	7.60E-03	0.00E+00	4.31E+00	0.00E+00	4.31E+00	1.02E-03	1.42E-01	4.45E+00	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	3.13E-02	0.00E+00	0.00E+00	1.65E-02	0.00E+00	1.65E-02	0.00E+00	4.61E-05	1.65E-02	1.41E+00	<1	1.41E+01	<1
Nickel	3.26E+02	5.59E-02	0.00E+00	3.40E+01	0.00E+00	3.40E+01	7.49E-03	4.81E-01	3.45E+01	1.70E+00	2.03E+01	1.48E+01	2.33E+00
Selenium	1.13E+00	0.00E+00	0.00E+00	1.36E-01	0.00E+00	1.36E-01	0.00E+00	1.66E-03	1.38E-01	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	1.99E+00	0.00E+00	0.00E+00	1.44E-02	0.00E+00	1.44E-02	0.00E+00	2.93E-03	1.73E-02	4.80E-01	<1	1.43E+00	<1
Vanadium	7.64E+01	1.80E-02	0.00E+00	4.30E-01	0.00E+00	4.30E-01	2.41E-03	1.13E-01	5.45E-01	4.16E+00	<1	9.44E+00	<1
Zinc	2.45E+02	5.37E-01	0.00E+00	6.97E+01	0.00E+00	6.97E+01	7.20E-02	3.62E-01	7.01E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.45E+01	7.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-03	6.56E-02	6.66E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	1.10E+02	2.24E+01	0.00E+00	1.82E+00	0.00E+00	1.82E+00	3.00E+00	1.62E-01	4.99E+00	2.66E+01	<1	4.90E+01	<1
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	2.49E+01	0.00E+00	0.00E+00	4.91E+00	0.00E+00	4.91E+00	0.00E+00	3.68E-02	4.95E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	4.90E+01	0.00E+00	0.00E+00	1.59E+01	0.00E+00	1.59E+01	0.00E+00	7.23E-02	1.60E+01				
Fluoranthene	6.10E+02	9.30E-03	0.00E+00	2.48E+02	0.00E+00	2.48E+02	1.25E-03	8.99E-01	2.49E+02				
Fluorene	1.30E+01	0.00E+00	0.00E+00	1.67E+01	0.00E+00	1.67E+01	0.00E+00	1.92E-02	1.67E+01				
Naphthalene	2.39E+00	0.00E+00	0.00E+00	1.41E+00	0.00E+00	1.41E+00	0.00E+00	3.53E-03	1.41E+00				
Phenanthrene	2.00E+02	0.00E+00	0.00E+00	4.62E+01	0.00E+00	4.62E+01	0.00E+00	2.95E-01	4.65E+01				
Total LMW PAHs						3.33E+02	1.25E-03	1.33E+00	3.35E+02	6.56E+01	5.10E+00	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.11E+02	3.00E-03	0.00E+00	6.62E+01	0.00E+00	6.62E+01	4.02E-04	4.58E-01	6.67E+01				
Benzo(A)Pyrene	3.40E+02	3.90E+00	0.00E+00	6.06E+01	0.00E+00	6.06E+01	5.23E-01	5.02E-01	6.17E+01				
Benzo(b)fluoranthene	5.22E+02	1.00E-02	0.00E+00	1.82E+02	0.00E+00	1.82E+02	1.34E-03	7.69E-01	1.83E+02				
Benzo(g,h,i)perylene	2.46E+02	3.90E-03	0.00E+00	9.69E+01	0.00E+00	9.69E+01	5.23E-04	3.63E-01	9.73E+01				
Benzo(k)fluoranthene	3.44E+02	0.00E+00	0.00E+00	1.20E+02	0.00E+00	1.20E+02	0.00E+00	5.06E-01	1.20E+02				
Chrysene	3.58E+02	7.60E-03	0.00E+00	1.10E+02	0.00E+00	1.10E+02	1.02E-03	5.28E-01	1.11E+02				
Dibenz(A,H)Anthracene	1.17E+02	0.00E+00	0.00E+00	3.63E+01	0.00E+00	3.63E+01	0.00E+00	1.73E-01	3.65E+01				
Indeno (1,2,3-CD) Pyrene	2.25E+02	3.10E-03	0.00E+00	8.63E+01	0.00E+00	8.63E+01	4.15E-04	3.32E-01	8.66E+01				
Pyrene	5.21E+02	7.00E-03	0.00E+00	1.22E+02	0.00E+00	1.22E+02	9.38E-04	7.68E-01	1.23E+02				
Total HMW PAHs						8.80E+02	5.27E-01	4.40E+00	8.85E+02	6.15E-01	1.44E+03	3.84E+01	2.30E+01
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.58E+00	0.00E+00	0.00E+00	3.34E+01	0.00E+00	3.34E+01	0.00E+00	6.74E-03	3.34E+01	1.83E+01	1.82E+00	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	4.72E+00	0.00E+00	0.00E+00	4.40E+00	0.00E+00	4.40E+00	0.00E+00	6.96E-03	4.41E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H21-15
Refined Exposure Evaluation - Short-tailed Shrew
North Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	ND	3.75E-02	0	Bechtel-Jacobs (1998a) ^g	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Barium	NA	6.40E+02	1.56E-01	9.99E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	5.82E+01	Sample et al. (1998a)	6.83E-04	4.37E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	2.50E+00	Regression ^a	1.03E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.72E+01	Sample et al. (1999)	Regression ^f	4.39E-01	Sample et al. (1998b)
Chromium	NA	1.14E+01	4.10E-02	4.66E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	3.48E+00	Sample et al. (1998a)	Regression ^f	1.38E+00	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	2.03E+02	Regression ^a	1.58E+01	Bechtel-Jacobs (1998a)	5.15E-01	1.05E+02	Sample et al. (1998a)	Regression ^f	1.66E+01	Sample et al. (1998b)
Lead	NA	3.44E+01	Regression ^a	1.93E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.40E+01	Sample et al. (1999)	Regression ^f	5.16E+00	Sample et al. (1998b)
Manganese	NA	0.00E+00	7.90E-02	0.00E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	0.00E+00	Sample et al. (1999)	2.05E-02	0.00E+00	Sample et al. (1998b) ⁱ
Mercury	NA	3.49E-01	Regression ^a	2.08E-01	Bechtel-Jacobs (1998a)	3.93E+00	1.37E+00	Sample et al. (1998a)	3.81E-01	1.33E-01	LANL (2015)
Nickel	NA	1.90E+01	Regression ^a	9.78E-01	Bechtel-Jacobs (1998a)	7.78E-01	1.48E+01	Sample et al. (1998a)	Regression ^f	3.08E+00	Sample et al. (1998b)
Selenium	NA	5.72E-01	Regression ^a	2.74E-01	Bechtel-Jacobs (1998a)	Regression ^d	6.16E-01	Sample et al. (1998a)	Regression ^f	5.35E-01	Sample et al. (1998b)
Silver		2.35E+01	1.40E-02	1.66E+01	Bechtel-Jacobs (1998a)m	2.05E+00	9.38E+00	Sample et al. (1998a)	4.00E-03	2.17E+00	Sample et al. (1998b)
Thallium	NA	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	1.16E+02	Regression ^a	6.71E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.06E+02	Sample et al. (1998a)	Regression ^f	1.10E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	4.43E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											

Table H22-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	2.46E-01	Regression ^a	2.90E-02	USEPA (2007a)	1.59E+00	3.92E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	8.21E-01	Regression ^a	1.05E-01	USEPA (2007a)	1.33E+00	1.09E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	2.20E+00	2.38E-02	5.23E-02	USEPA (2007a)	5.44E+01	1.20E+02	USEPA (2007a)	7.79E-01	1.71E+00	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	5.80E-02	8.14E-01	4.72E-02	USEPA (2007a)	1.03E+01	5.98E-01	USEPA (2007a)	4.49E-01	2.60E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H22-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H22-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-0.996	5.44E-01	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet]_{invertebrate})$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H22-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	1.00E+00	0.00E+00	Assumption ^c	5.00E-02	0.00E+00	Baes et al. (1984) ^e
Arsenic	NA	ND	3.75E-02	0	Bechtel-Jacobs (1998a) ^g	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Barium	NA	3.19E+02	1.56E-01	4.98E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.91E+01	Sample et al. (1998a)	6.83E-04	2.18E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	1.75E+00	Regression ^a	8.44E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.29E+01	Sample et al. (1999)	Regression ^f	3.71E-01	Sample et al. (1998b)
Chromium	NA	1.10E+01	4.10E-02	4.52E-01	Bechtel-Jacobs (1998a) ^g	3.06E-01	3.37E+00	Sample et al. (1998a)	Regression ^f	1.35E+00	Sample et al. (1998b)
Cobalt	NA	4.65E+00	7.50E-03	3.49E-02	Bechtel-Jacobs (1998a) ^g	1.22E-01	5.67E-01	Sample et al. (1998a)	Regression ^f	8.56E-02	Sample et al. (1998b)
Copper	NA	1.93E+02	Regression ^a	1.55E+01	Bechtel-Jacobs (1998a)	5.15E-01	9.93E+01	Sample et al. (1998a)	Regression ^f	1.65E+01	Sample et al. (1998b)
Lead	NA	4.30E+01	Regression ^a	2.19E+00	Bechtel-Jacobs (1998a)	Regression ^d	1.67E+01	Sample et al. (1999)	Regression ^f	5.69E+00	Sample et al. (1998b)
Manganese	NA	9.88E+01	7.90E-02	7.81E+00	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.02E+01	Sample et al. (1999)	2.05E-02	2.03E+00	Sample et al. (1998b) ⁱ
Mercury	NA	4.90E-01	Regression ^a	2.51E-01	Bechtel-Jacobs (1998a)	3.93E+00	1.93E+00	Sample et al. (1998a)	3.81E-01	1.87E-01	LANL (2015)
Nickel	NA	1.64E+01	Regression ^a	8.78E-01	Bechtel-Jacobs (1998a)	7.78E-01	1.28E+01	Sample et al. (1998a)	Regression ^f	2.88E+00	Sample et al. (1998b)
Selenium	NA	7.83E-01	Regression ^a	3.88E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.75E-01	Sample et al. (1998a)	Regression ^f	6.02E-01	Sample et al. (1998b)
Silver		9.03E+00	1.40E-02	5.76E+00	Bechtel-Jacobs (1998a)m	2.05E+00	4.65E+00	Sample et al. (1998a)	4.00E-03	1.51E+00	Sample et al. (1998b)
Thallium	NA	0.00E+00	4.00E-03	0.00E+00	Baes et al. (1984)	5.41E-02	0.00E+00	USCHPPM (2004)	1.08E-01	0.00E+00	Baes et al. (1984) ^e
Vanadium	NA	0.00E+00	4.85E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	4.20E-02	0.00E+00	Sample et al. (1998a)	1.23E-02	0.00E+00	Sample et al. (1998b) ⁱ
Zinc	NA	1.20E+02	Regression ^a	6.86E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.12E+02	Sample et al. (1998a)	Regression ^f	1.10E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	2.25E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H22-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	3.29E-01	Regression ^a	3.45E-02	USEPA (2007a)	1.59E+00	5.24E-01	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	1.71E+00	Regression ^a	2.15E-01	USEPA (2007a)	1.33E+00	2.28E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^j
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^j
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^j
Bis(2-ethylhexyl)phthalate	8.39	1.68E+00	2.38E-02	3.99E-02	USEPA (2007a)	5.44E+01	9.13E+01	USEPA (2007a)	7.79E-01	1.31E+00	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^j
Di-n-butyl phthalate	4.61	2.26E-02	8.14E-01	1.84E-02	USEPA (2007a)	1.03E+01	2.33E-01	USEPA (2007a)	4.49E-01	1.01E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^j
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^j
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)

Table H22-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H22-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - South Percolation Pond Area (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-0.996	5.44E-01	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log \text{BAF} = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([\text{tissue}]) = B0 + B1(\ln[\text{soil}])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[\text{tissue}] = 0.198 + 0.00452([\text{diet}_{\text{invertebrate}}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H22-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	6.02E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	7.88E-01	6.40E+02	NA	2.82E+00	---	1.81E+03	Hamilton et al. (2002)
Beryllium	NA	0.00E+00	0.00E+00	NA	1.67E-01	---	0.00E+00	Hamilton et al. (2002)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	4.69E-02	2.03E+02	NA	6.61E-01	---	1.34E+02	Bechtel-Jacobs (1998b) ^c
Lead	NA	0.00E+00	3.44E+01	NA	8.00E-02	---	2.75E+00	Bechtel-Jacobs (1998b) ^c
Manganese		8.87E-02	0.00E+00					
Mercury	NA	0.00E+00	3.49E-01	NA	2.84E+00	---	9.91E-01	Bechtel-Jacobs (1998c) ^c
Nickel	NA	0.00E+00	1.90E+01	NA	1.34E-01	---	2.54E+00	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)
Vanadium	NA	6.61E-03	1.18E+01	NA	2.50E-01	---	2.95E+00	Hamilton and Buhl (2002)
Zinc	NA	0.00E+00	1.16E+02	NA	8.40E-01	---	9.71E+01	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	4.28E-02	4.43E+00	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	0.00E+00	7.04E-01	4.58E+00	---	0.00E+00	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	3.59E-02	6.73E-01	4.37E+00	---	1.57E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	6.17E-01	6.41E-01	4.17E+00	---	2.57E+00	DiToro and McGrath (2000)

Table H22-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	0.00E+00	6.92E-01	4.50E+00	---	0.00E+00	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	2.01E-01	6.70E-01	4.36E+00	---	8.75E-01	DiToro and McGrath (2000)
Total LMW PAHs							3.60E+00	

Table H22-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	0.00E+00	2.46E-01	5.56E-01	3.61E+00	---	8.91E-01	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	8.21E-01	5.86E-01	3.81E+00	---	3.13E+00	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	7.26E-01	5.66E-01	3.68E+00	---	2.67E+00	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	2.34E-01	5.77E-01	3.75E+00	---	8.79E-01	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	9.12E-01	6.07E-01	3.94E+00	---	3.60E+00	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	1.32E-01	5.56E-01	3.61E+00	---	4.78E-01	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	2.80E-04	9.84E-01	5.55E-01	3.61E+00	---	3.55E+00	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	5.16E-01	6.50E-01	4.23E+00	---	2.18E+00	DiToro and McGrath (2000)
Total HMW PAHs							1.74E+01	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					

Table H22-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:
NA, Normalized BSAF was not applicable for metals
a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)
b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:
$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)
f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)
f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)
c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H22-3
Refined Exposure Evaluation - American Dipper
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	9.99E-01	0.00E+00	9.99E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	6.40E+02	7.88E-01	3.00E+02	0.00E+00	3.00E+02	1.31E-01	2.12E+00	3.02E+02	7.35E+01	4.11E+00	1.31E+02	2.30E+00
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.03E+02	4.69E-02	2.23E+01	0.00E+00	2.23E+01	7.78E-03	6.74E-01	2.29E+01	4.05E+00	5.66E+00	3.48E+01	<1
Lead	3.44E+01	0.00E+00	4.57E-01	0.00E+00	4.57E-01	0.00E+00	1.14E-01	5.71E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	1.47E-02	0.00E+00	1.47E-02	1.79E+02	<1	3.77E+02	<1
Mercury	3.49E-01	0.00E+00	1.65E-01	0.00E+00	1.65E-01	0.00E+00	1.16E-03	1.66E-01	4.50E-01	<1	9.10E-01	<1
Nickel	1.90E+01	0.00E+00	4.22E-01	0.00E+00	4.22E-01	0.00E+00	6.29E-02	4.85E-01	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.18E+01	6.61E-03	4.90E-01	0.00E+00	4.90E-01	1.10E-03	3.92E-02	5.30E-01	3.44E-01	1.54E+00	1.70E+00	<1
Zinc	1.16E+02	0.00E+00	1.61E+01	0.00E+00	1.61E+01	0.00E+00	3.84E-01	1.65E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	7.11E-03	1.47E-02	2.18E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	3.59E-02	0.00E+00	2.60E-02	0.00E+00	2.60E-02	0.00E+00	1.19E-04	2.62E-02				
Fluoranthene	6.17E-01	0.00E+00	4.27E-01	0.00E+00	4.27E-01	0.00E+00	2.05E-03	4.29E-01				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.01E-01	0.00E+00	1.45E-01	0.00E+00	1.45E-01	0.00E+00	6.66E-04	1.46E-01				
Total LMW PAHs					5.98E-01	0.00E+00	2.83E-03	6.01E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.46E-01	0.00E+00	1.48E-01	0.00E+00	1.48E-01	0.00E+00	8.18E-04	1.49E-01				
Benzo(A)Pyrene	8.21E-01	0.00E+00	5.19E-01	0.00E+00	5.19E-01	0.00E+00	2.72E-03	5.21E-01				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	7.26E-01	0.00E+00	4.43E-01	0.00E+00	4.43E-01	0.00E+00	2.41E-03	4.45E-01				
Benzo(k)fluoranthene	2.34E-01	0.00E+00	1.46E-01	0.00E+00	1.46E-01	0.00E+00	7.78E-04	1.47E-01				
Chrysene	9.12E-01	0.00E+00	5.97E-01	0.00E+00	5.97E-01	0.00E+00	3.03E-03	6.00E-01				
Dibenz(A,H)Anthracene	1.32E-01	0.00E+00	7.93E-02	0.00E+00	7.93E-02	0.00E+00	4.39E-04	7.98E-02				
Indeno (1,2,3-CD) Pyrene	9.84E-01	2.80E-04	5.90E-01	0.00E+00	5.90E-01	4.65E-05	3.27E-03	5.93E-01				
Pyrene	5.16E-01	0.00E+00	3.62E-01	0.00E+00	3.62E-01	0.00E+00	1.71E-03	3.64E-01				
Total HMW PAHs					2.88E+00	4.65E-05	1.52E-02	2.90E+00	2.00E+00	1.45E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H22-3
Refined Exposure Evaluation - American Dipper
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-4
Refined Exposure Evaluation - American Woodcock
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.07E-01	0.00E+00	7.07E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	6.40E+02	7.88E-01	1.17E+00	6.16E+00	0.00E+00	7.33E+00	9.26E-02	5.64E+00	1.31E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	1.20E-02	1.81E+00	0.00E+00	1.83E+00	0.00E+00	2.20E-02	1.85E+00	1.47E+00	1.26E+00	6.35E+00	<1
Chromium	1.14E+01	0.00E+00	5.47E-03	3.68E-01	0.00E+00	3.73E-01	0.00E+00	1.00E-01	4.73E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.03E+02	4.69E-02	1.86E-01	1.11E+01	0.00E+00	1.12E+01	5.51E-03	1.79E+00	1.30E+01	4.05E+00	3.22E+00	3.48E+01	<1
Lead	3.44E+01	0.00E+00	2.27E-02	1.48E+00	0.00E+00	1.50E+00	0.00E+00	3.03E-01	1.80E+00	1.63E+00	1.11E+00	4.46E+01	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-02	0.00E+00	1.04E-02	1.79E+02	<1	3.77E+02	<1
Mercury	3.49E-01	0.00E+00	2.45E-03	1.45E-01	0.00E+00	1.48E-01	0.00E+00	3.08E-03	1.51E-01	4.50E-01	<1	9.10E-01	<1
Nickel	1.90E+01	0.00E+00	1.15E-02	1.56E+00	0.00E+00	1.57E+00	0.00E+00	1.67E-01	1.74E+00	6.71E+00	<1	1.86E+01	<1
Selenium	5.72E-01	0.00E+00	3.22E-03	6.51E-02	0.00E+00	6.83E-02	0.00E+00	5.04E-03	7.34E-02	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	1.95E-01	9.92E-01	0.00E+00	1.19E+00	0.00E+00	2.07E-01	1.39E+00	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.76E-04	0.00E+00	7.76E-04	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	0.00E+00	7.89E-01	4.30E+01	0.00E+00	4.37E+01	0.00E+00	1.02E+00	4.48E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-03	3.90E-02	4.41E-02	4.00E-02	1.10E+00	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.46E-01	0.00E+00	3.41E-04	4.14E-02	0.00E+00	4.18E-02	0.00E+00	2.17E-03	4.39E-02				
Benzo(A)Pyrene	8.21E-01	0.00E+00	1.23E-03	1.15E-01	0.00E+00	1.17E-01	0.00E+00	7.23E-03	1.24E-01				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	3.29E-05	--	3.29E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.58E-01	3.29E-05	9.40E-03	1.68E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	6.15E-04	1.27E+01	0.00E+00	1.27E+01	0.00E+00	1.94E-02	1.27E+01	1.10E+00	1.15E+01	1.10E+01	1.152496213
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	ND	5.55E-04	6.32E-02	0.00E+00	6.38E-02	--	5.11E-04	6.43E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H22-4
Refined Exposure Evaluation - American Woodcock
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-5
Refined Exposure Evaluation - Belted Kingfisher
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	9.48E-01	0.00E+00	9.48E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	6.40E+02	7.88E-01	2.84E+01	0.00E+00	2.84E+01	1.24E-01	0.00E+00	2.86E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.03E+02	4.69E-02	2.11E+00	0.00E+00	2.11E+00	7.39E-03	0.00E+00	2.12E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.44E+01	0.00E+00	4.34E-02	0.00E+00	4.34E-02	0.00E+00	0.00E+00	4.34E-02	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	1.40E-02	0.00E+00	1.40E-02	1.79E+02	<1	3.77E+02	<1
Mercury	3.49E-01	0.00E+00	1.56E-02	0.00E+00	1.56E-02	0.00E+00	0.00E+00	1.56E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.90E+01	0.00E+00	4.00E-02	0.00E+00	4.00E-02	0.00E+00	0.00E+00	4.00E-02	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.18E+01	6.61E-03	4.65E-02	0.00E+00	4.65E-02	1.04E-03	0.00E+00	4.75E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	0.00E+00	1.53E+00	0.00E+00	1.53E+00	0.00E+00	0.00E+00	1.53E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	6.75E-03	0.00E+00	6.75E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	3.59E-02	0.00E+00	2.47E-03	0.00E+00	2.47E-03	0.00E+00	0.00E+00	2.47E-03				
Fluoranthene	6.17E-01	0.00E+00	4.06E-02	0.00E+00	4.06E-02	0.00E+00	0.00E+00	4.06E-02				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.01E-01	0.00E+00	1.38E-02	0.00E+00	1.38E-02	0.00E+00	0.00E+00	1.38E-02				
Total LMW PAHs					5.68E-02	0.00E+00	0.00E+00	5.68E-02	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.46E-01	0.00E+00	1.40E-02	0.00E+00	1.40E-02	0.00E+00	0.00E+00	1.40E-02				
Benzo(A)Pyrene	8.21E-01	0.00E+00	4.93E-02	0.00E+00	4.93E-02	0.00E+00	0.00E+00	4.93E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	7.26E-01	0.00E+00	4.20E-02	0.00E+00	4.20E-02	0.00E+00	0.00E+00	4.20E-02				
Benzo(k)fluoranthene	2.34E-01	0.00E+00	1.38E-02	0.00E+00	1.38E-02	0.00E+00	0.00E+00	1.38E-02				
Chrysene	9.12E-01	0.00E+00	5.67E-02	0.00E+00	5.67E-02	0.00E+00	0.00E+00	5.67E-02				
Dibenz(A,H)Anthracene	1.32E-01	0.00E+00	7.53E-03	0.00E+00	7.53E-03	0.00E+00	0.00E+00	7.53E-03				
Indeno (1,2,3-CD) Pyrene	9.84E-01	2.80E-04	5.60E-02	0.00E+00	5.60E-02	4.41E-05	0.00E+00	5.61E-02				
Pyrene	5.16E-01	0.00E+00	3.44E-02	0.00E+00	3.44E-02	0.00E+00	0.00E+00	3.44E-02				
Total HMW PAHs					2.74E-01	4.41E-05	0.00E+00	2.74E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H22-5
Refined Exposure Evaluation - Belted Kingfisher
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-6
Refined Exposure Evaluation - Mourning Dove
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E-01	0.00E+00	6.87E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	6.40E+02	7.88E-01	1.14E+01	0.00E+00	0.00E+00	1.14E+01	8.99E-02	4.97E+00	1.65E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	1.17E-01	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.94E-02	1.36E-01	1.47E+00	<1	6.35E+00	<1
Chromium	1.14E+01	0.00E+00	5.32E-02	0.00E+00	0.00E+00	5.32E-02	0.00E+00	8.82E-02	1.41E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.03E+02	4.69E-02	1.81E+00	0.00E+00	0.00E+00	1.81E+00	5.35E-03	1.58E+00	3.39E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.44E+01	0.00E+00	2.20E-01	0.00E+00	0.00E+00	2.20E-01	0.00E+00	2.67E-01	4.87E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-02	0.00E+00	1.01E-02	1.79E+02	<1	3.77E+02	<1
Mercury	3.49E-01	0.00E+00	2.38E-02	0.00E+00	0.00E+00	2.38E-02	0.00E+00	2.71E-03	2.65E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.90E+01	0.00E+00	1.12E-01	0.00E+00	0.00E+00	1.12E-01	0.00E+00	1.47E-01	2.59E-01	6.71E+00	<1	1.86E+01	<1
Selenium	5.72E-01	0.00E+00	3.13E-02	0.00E+00	0.00E+00	3.13E-02	0.00E+00	4.44E-03	3.57E-02	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	1.89E+00	0.00E+00	0.00E+00	1.89E+00	0.00E+00	1.82E-01	2.08E+00	2.02E+00	1.03E+00	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E-04	0.00E+00	7.54E-04	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	0.00E+00	7.66E+00	0.00E+00	0.00E+00	7.66E+00	0.00E+00	8.97E-01	8.56E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.89E-03	3.44E-02	3.93E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.46E-01	0.00E+00	3.31E-03	0.00E+00	0.00E+00	3.31E-03	0.00E+00	1.91E-03	5.22E-03				
Benzo(A)Pyrene	8.21E-01	0.00E+00	1.20E-02	0.00E+00	0.00E+00	1.20E-02	0.00E+00	6.37E-03	1.84E-02				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	3.20E-05	--	3.20E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.53E-02	3.20E-05	8.28E-03	2.36E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	5.97E-03	0.00E+00	0.00E+00	5.97E-03	0.00E+00	1.71E-02	2.30E-02	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	5.39E-03	0.00E+00	0.00E+00	5.39E-03	0.00E+00	4.50E-04	5.84E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H22-6
Refined Exposure Evaluation - Mourning Dove
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-7
Refined Exposure Evaluation - Red-tailed Hawk
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-01	0.00E+00	4.94E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	6.40E+02	7.88E-01	0.00E+00	0.00E+00	3.58E-02	3.58E-02	6.46E-02	1.36E+00	1.47E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-02	3.60E-02	0.00E+00	5.33E-03	4.13E-02	1.47E+00	<1	6.35E+00	<1
Chromium	1.14E+01	0.00E+00	0.00E+00	0.00E+00	1.13E-01	1.13E-01	0.00E+00	2.42E-02	1.38E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.03E+02	4.69E-02	0.00E+00	0.00E+00	1.36E+00	1.36E+00	3.85E-03	4.33E-01	1.80E+00	4.05E+00	<1	3.48E+01	<1
Lead	3.44E+01	0.00E+00	0.00E+00	0.00E+00	4.23E-01	4.23E-01	0.00E+00	7.34E-02	4.96E-01	1.63E+00	<1	4.46E+01	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.28E-03	0.00E+00	7.28E-03	1.79E+02	<1	3.77E+02	<1
Mercury	3.49E-01	0.00E+00	0.00E+00	0.00E+00	1.09E-02	1.09E-02	0.00E+00	7.45E-04	1.17E-02	4.50E-01	<1	9.10E-01	<1
Nickel	1.90E+01	0.00E+00	0.00E+00	0.00E+00	2.52E-01	2.52E-01	0.00E+00	4.04E-02	2.93E-01	6.71E+00	<1	1.86E+01	<1
Selenium	5.72E-01	0.00E+00	0.00E+00	0.00E+00	4.38E-02	4.38E-02	0.00E+00	1.22E-03	4.51E-02	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	0.00E+00	0.00E+00	1.78E-01	1.78E-01	0.00E+00	5.01E-02	2.28E-01	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.42E-04	0.00E+00	5.42E-04	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	0.00E+00	0.00E+00	0.00E+00	9.00E+00	9.00E+00	0.00E+00	2.47E-01	9.25E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-03	9.44E-03	1.30E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.46E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-04	5.25E-04				
Benzo(A)Pyrene	8.21E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-03	1.75E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	2.30E-05	--	2.30E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	2.30E-05	2.28E-03	2.30E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-01	1.41E-01	0.00E+00	4.69E-03	1.45E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	0.00E+00	0.00E+00	2.14E-03	2.14E-03	0.00E+00	1.24E-04	2.26E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H22-7
Refined Exposure Evaluation - Red-tailed Hawk
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.53E-01	0.00E+00	9.53E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	6.40E+02	7.88E-01	0.00E+00	9.22E+00	0.00E+00	9.22E+00	1.25E-01	0.00E+00	9.35E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	2.72E+00	0.00E+00	2.72E+00	0.00E+00	0.00E+00	2.72E+00	1.47E+00	1.85E+00	6.35E+00	<1
Chromium	1.14E+01	0.00E+00	0.00E+00	5.51E-01	0.00E+00	5.51E-01	0.00E+00	0.00E+00	5.51E-01	2.66E+00	<1	1.56E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.03E+02	4.69E-02	0.00E+00	1.66E+01	0.00E+00	1.66E+01	7.43E-03	0.00E+00	1.66E+01	4.05E+00	4.09E+00	3.48E+01	<1
Lead	3.44E+01	0.00E+00	0.00E+00	2.21E+00	0.00E+00	2.21E+00	0.00E+00	0.00E+00	2.21E+00	1.63E+00	1.36E+00	4.46E+01	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	0.00E+00	1.41E-02	1.79E+02	<1	3.77E+02	<1
Mercury	3.49E-01	0.00E+00	0.00E+00	2.17E-01	0.00E+00	2.17E-01	0.00E+00	0.00E+00	2.17E-01	4.50E-01	<1	9.10E-01	<1
Nickel	1.90E+01	0.00E+00	0.00E+00	2.34E+00	0.00E+00	2.34E+00	0.00E+00	0.00E+00	2.34E+00	6.71E+00	<1	1.86E+01	<1
Selenium	5.72E-01	0.00E+00	0.00E+00	9.75E-02	0.00E+00	9.75E-02	0.00E+00	0.00E+00	9.75E-02	2.90E-01	<1	8.20E-01	<1
Silver	2.35E+01	0.00E+00	0.00E+00	1.49E+00	0.00E+00	1.49E+00	0.00E+00	0.00E+00	1.49E+00	2.02E+00	<1	6.05E+01	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-03	0.00E+00	1.05E-03	3.44E-01	<1	1.70E+00	<1
Zinc	1.16E+02	0.00E+00	0.00E+00	6.43E+01	0.00E+00	6.43E+01	0.00E+00	0.00E+00	6.43E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E-03	0.00E+00	6.78E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.46E-01	0.00E+00	0.00E+00	6.20E-02	0.00E+00	6.20E-02	0.00E+00	0.00E+00	6.20E-02				
Benzo(A)Pyrene	8.21E-01	0.00E+00	0.00E+00	1.73E-01	0.00E+00	1.73E-01	0.00E+00	0.00E+00	1.73E-01				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	4.43E-05	--	4.43E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						2.35E-01	4.43E-05	0.00E+00	2.35E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	0.00E+00	1.90E+01	0.00E+00	1.90E+01	0.00E+00	0.00E+00	1.90E+01	1.10E+00	1.72E+01	1.10E+01	1.72E+00
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	0.00E+00	9.47E-02	0.00E+00	9.47E-02	0.00E+00	0.00E+00	9.47E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H22-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-9
Refined Exposure Evaluation - Canada Lynx
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-01	0.00E+00	1.88E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	6.40E+02	7.88E-01	0.00E+00	0.00E+00	1.36E-02	1.36E-02	2.46E-02	5.60E-01	5.98E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	2.50E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-02	1.37E-02	0.00E+00	2.19E-03	1.59E-02	7.70E-01	<1	6.87E+00	<1
Chromium	1.14E+01	0.00E+00	0.00E+00	0.00E+00	4.32E-02	4.32E-02	0.00E+00	9.94E-03	5.31E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.03E+02	4.69E-02	0.00E+00	0.00E+00	5.19E-01	5.19E-01	1.47E-03	1.78E-01	6.98E-01	5.60E+00	<1	8.27E+01	<1
Lead	3.44E+01	0.00E+00	0.00E+00	0.00E+00	1.61E-01	1.61E-01	0.00E+00	3.01E-02	1.91E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-03	0.00E+00	2.77E-03	5.15E+01	<1	1.46E+02	<1
Mercury	3.49E-01	0.00E+00	0.00E+00	0.00E+00	4.16E-03	4.16E-03	0.00E+00	3.06E-04	4.47E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.90E+01	0.00E+00	0.00E+00	0.00E+00	9.62E-02	9.62E-02	0.00E+00	1.66E-02	1.13E-01	1.70E+00	<1	1.48E+01	<1
Selenium	5.72E-01	0.00E+00	0.00E+00	0.00E+00	1.67E-02	1.67E-02	0.00E+00	5.00E-04	1.72E-02	1.43E-01	<1	6.60E-01	<1
Silver	2.35E+01	0.00E+00	0.00E+00	0.00E+00	6.76E-02	6.76E-02	0.00E+00	2.06E-02	8.82E-02	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.06E-04	0.00E+00	2.06E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.16E+02	0.00E+00	0.00E+00	0.00E+00	3.43E+00	3.43E+00	0.00E+00	1.01E-01	3.53E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-03	3.87E-03	5.21E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	2.46E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E-04	2.16E-04				
Benzo(A)Pyrene	8.21E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.18E-04	7.18E-04				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	8.75E-06	--	8.75E-06				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	8.75E-06	9.34E-04	9.43E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-02	5.35E-02	0.00E+00	1.92E-03	5.55E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	0.00E+00	0.00E+00	8.14E-04	8.14E-04	0.00E+00	5.07E-05	8.64E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-9
Refined Exposure Evaluation - Canada Lynx
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-10
Refined Exposure Evaluation - Grizzly Bear
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.30E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	6.40E+02	7.88E-01	1.40E+00	1.89E-01	9.43E-04	0.00E+00	1.59E+00	1.70E-02	3.87E-01	2.00E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	2.50E+00	0.00E+00	1.44E-02	5.56E-02	9.47E-04	0.00E+00	7.09E-02	0.00E+00	1.51E-03	7.24E-02	7.70E-01	<1	6.87E+00	<1
Chromium	1.14E+01	0.00E+00	6.54E-03	1.13E-02	2.98E-03	0.00E+00	2.08E-02	0.00E+00	6.87E-03	2.77E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.03E+02	4.69E-02	2.22E-01	3.39E-01	3.58E-02	0.00E+00	5.97E-01	1.01E-03	1.23E-01	7.20E-01	5.60E+00	<1	8.27E+01	<1
Lead	3.44E+01	0.00E+00	2.71E-02	4.53E-02	1.11E-02	0.00E+00	8.35E-02	0.00E+00	2.08E-02	1.04E-01	4.70E+00	<1	1.86E+02	<1
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-03	0.00E+00	1.92E-03	5.15E+01	<1	1.46E+02	<1
Mercury	3.49E-01	0.00E+00	2.93E-03	4.45E-03	2.88E-04	0.00E+00	7.66E-03	0.00E+00	2.11E-04	7.87E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.90E+01	0.00E+00	1.37E-02	4.78E-02	6.65E-03	0.00E+00	6.82E-02	0.00E+00	1.15E-02	7.96E-02	1.70E+00	<1	1.48E+01	<1
Selenium	5.72E-01	0.00E+00	3.85E-03	1.99E-03	1.15E-03	0.00E+00	7.00E-03	0.00E+00	3.46E-04	7.34E-03	1.43E-01	<1	6.60E-01	<1
Silver	2.35E+01	0.00E+00	2.33E-01	3.04E-02	4.68E-03	0.00E+00	2.68E-01	0.00E+00	1.42E-02	2.82E-01	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-04	0.00E+00	1.43E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.16E+02	0.00E+00	9.42E-01	1.32E+00	2.37E-01	0.00E+00	2.50E+00	0.00E+00	6.99E-02	2.57E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.25E-04	2.68E-03	3.60E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	2.46E-01	0.00E+00	4.07E-04	1.27E-03	0.00E+00	0.00E+00	1.68E-03	0.00E+00	1.49E-04	1.83E-03				
Benzo[A]Pyrene	8.21E-01	0.00E+00	1.47E-03	3.54E-03	0.00E+00	0.00E+00	5.01E-03	0.00E+00	4.96E-04	5.51E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	0.00E+00	6.05E-06	--	6.05E-06				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs							6.69E-03	6.05E-06	6.45E-04	7.34E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	2.20E+00	0.00E+00	7.35E-04	3.88E-01	3.70E-03	0.00E+00	3.92E-01	0.00E+00	1.33E-03	3.94E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	5.80E-02	0.00E+00	6.63E-04	1.94E-03	5.62E-05	0.00E+00	2.66E-03	0.00E+00	3.51E-05	2.69E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-10
Refined Exposure Evaluation - Grizzly Bear
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-11
Refined Exposure Evaluation - Long-tailed Weasel
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{Low}	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-01	0.00E+00	3.10E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	3.19E+02	7.88E-01	0.00E+00	0.00E+00	1.12E-02	1.12E-02	4.05E-02	2.63E-01	3.15E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-02	1.91E-02	0.00E+00	1.44E-03	2.05E-02	7.70E-01	<1	6.87E+00	<1
Chromium	1.10E+01	0.00E+00	0.00E+00	0.00E+00	6.95E-02	6.95E-02	0.00E+00	9.07E-03	7.86E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	4.65E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-03	4.40E-03	0.00E+00	3.83E-03	8.23E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	4.69E-02	0.00E+00	0.00E+00	8.48E-01	8.48E-01	2.41E-03	1.59E-01	1.01E+00	5.60E+00	<1	8.27E+01	<1
Lead	4.30E+01	0.00E+00	0.00E+00	0.00E+00	2.93E-01	2.93E-01	0.00E+00	3.54E-02	3.28E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+01	8.87E-02	0.00E+00	0.00E+00	1.04E-01	1.04E-01	4.57E-03	8.14E-02	1.90E-01	5.15E+01	<1	1.46E+02	<1
Mercury	4.90E-01	0.00E+00	0.00E+00	0.00E+00	9.61E-03	9.61E-03	0.00E+00	4.03E-04	1.00E-02	1.41E+00	<1	1.41E+01	<1
Nickel	1.64E+01	0.00E+00	0.00E+00	0.00E+00	1.48E-01	1.48E-01	0.00E+00	1.35E-02	1.62E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	0.00E+00	0.00E+00	3.10E-02	3.10E-02	0.00E+00	6.44E-04	3.16E-02	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	0.00E+00	0.00E+00	7.77E-02	7.77E-02	0.00E+00	7.43E-03	8.52E-02	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.40E-04	0.00E+00	3.40E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.20E+02	0.00E+00	0.00E+00	0.00E+00	5.67E+00	5.67E+00	0.00E+00	9.90E-02	5.76E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.25E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-03	1.85E-03	4.06E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.29E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-04	2.71E-04				
Benzo(A)Pyrene	1.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-03	1.41E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	1.44E-05	--	1.44E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	1.44E-05	1.68E-03	1.69E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	0.00E+00	0.00E+00	6.73E-02	6.73E-02	0.00E+00	1.38E-03	6.87E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.26E-02	0.00E+00	0.00E+00	0.00E+00	5.21E-04	5.21E-04	0.00E+00	1.86E-05	5.40E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-11
Refined Exposure Evaluation - Long-tailed Weasel
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{Low}	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-12
Refined Exposure Evaluation - Meadow Vole
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.04E-01	0.00E+00	9.04E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	3.19E+02	7.88E-01	7.48E+00	0.00E+00	0.00E+00	7.48E+00	1.18E-01	6.24E-01	8.23E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	1.27E-01	0.00E+00	0.00E+00	1.27E-01	0.00E+00	3.42E-03	1.30E-01	7.70E-01	<1	6.87E+00	<1
Chromium	1.10E+01	0.00E+00	6.78E-02	0.00E+00	0.00E+00	6.78E-02	0.00E+00	2.15E-02	8.93E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	4.65E+00	0.00E+00	5.24E-03	0.00E+00	0.00E+00	5.24E-03	0.00E+00	9.08E-03	1.43E-02	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	4.69E-02	2.33E+00	0.00E+00	0.00E+00	2.33E+00	7.05E-03	3.77E-01	2.71E+00	5.60E+00	<1	8.27E+01	<1
Lead	4.30E+01	0.00E+00	3.28E-01	0.00E+00	0.00E+00	3.28E-01	0.00E+00	8.40E-02	4.12E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+01	8.87E-02	1.17E+00	0.00E+00	0.00E+00	1.17E+00	1.33E-02	1.93E-01	1.38E+00	5.15E+01	<1	1.46E+02	<1
Mercury	4.90E-01	0.00E+00	3.76E-02	0.00E+00	0.00E+00	3.76E-02	0.00E+00	9.57E-04	3.86E-02	1.41E+00	<1	1.41E+01	<1
Nickel	1.64E+01	0.00E+00	1.32E-01	0.00E+00	0.00E+00	1.32E-01	0.00E+00	3.20E-02	1.64E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	5.82E-02	0.00E+00	0.00E+00	5.82E-02	0.00E+00	1.53E-03	5.98E-02	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	8.66E-01	0.00E+00	0.00E+00	8.66E-01	0.00E+00	1.76E-02	8.84E-01	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.93E-04	0.00E+00	9.93E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.20E+02	0.00E+00	1.03E+01	0.00E+00	0.00E+00	1.03E+01	0.00E+00	2.35E-01	1.05E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.25E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.44E-03	4.40E-03	1.08E-02	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.29E-01	0.00E+00	5.18E-03	0.00E+00	0.00E+00	5.18E-03	0.00E+00	6.43E-04	5.82E-03				
Benzo(A)Pyrene	1.71E+00	0.00E+00	3.23E-02	0.00E+00	0.00E+00	3.23E-02	0.00E+00	3.34E-03	3.56E-02				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	4.21E-05	--	4.21E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						3.75E-02	4.21E-05	3.99E-03	4.15E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	6.00E-03	0.00E+00	0.00E+00	6.00E-03	0.00E+00	3.28E-03	9.28E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.26E-02	0.00E+00	2.76E-03	0.00E+00	0.00E+00	2.76E-03	0.00E+00	4.41E-05	2.80E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-12
Refined Exposure Evaluation - Meadow Vole
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-13
Refined Exposure Evaluation - Mink
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-01	0.00E+00	2.60E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	6.40E+02	7.88E-01	0.00E+00	0.00E+00	0.00E+00	3.41E-02	0.00E+00	3.41E-02	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.03E+02	4.69E-02	0.00E+00	0.00E+00	0.00E+00	2.03E-03	0.00E+00	2.03E-03	5.60E+00	<1	8.27E+01	<1
Lead	3.44E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	0.00E+00	8.87E-02	0.00E+00	0.00E+00	0.00E+00	3.84E-03	0.00E+00	3.84E-03	5.15E+01	<1	1.46E+02	<1
Mercury	3.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	1.90E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.18E+01	6.61E-03	0.00E+00	0.00E+00	0.00E+00	2.86E-04	0.00E+00	2.86E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.16E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	4.43E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	1.85E-03	0.00E+00	1.85E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	3.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	6.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.01E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	2.46E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(A)Pyrene	8.21E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	7.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(k)fluoranthene	2.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	9.12E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Dibenz(A,H)Anthracene	1.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	9.84E-01	2.80E-04	0.00E+00	0.00E+00	0.00E+00	1.21E-05	0.00E+00	1.21E-05				
Pyrene	5.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total HMW PAHs					0.00E+00	1.21E-05	0.00E+00	1.21E-05	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-13
Refined Exposure Evaluation - Mink
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-14
Refined Exposure Evaluation - North American Wolverine
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.81E-01	0.00E+00	1.81E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	3.19E+02	7.88E-01	0.00E+00	0.00E+00	6.55E-03	6.55E-03	2.37E-02	2.69E-01	2.99E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-02	1.11E-02	0.00E+00	1.47E-03	1.26E-02	7.70E-01	<1	6.87E+00	<1
Chromium	1.10E+01	0.00E+00	0.00E+00	0.00E+00	4.06E-02	4.06E-02	0.00E+00	9.27E-03	4.98E-02	2.40E+00	<1	5.82E+01	<1
Cobalt	4.65E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-03	2.57E-03	0.00E+00	3.91E-03	6.48E-03	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	4.69E-02	0.00E+00	0.00E+00	4.95E-01	4.95E-01	1.41E-03	1.62E-01	6.59E-01	5.60E+00	<1	8.27E+01	<1
Lead	4.30E+01	0.00E+00	0.00E+00	0.00E+00	1.71E-01	1.71E-01	0.00E+00	3.62E-02	2.07E-01	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+01	8.87E-02	0.00E+00	0.00E+00	6.09E-02	6.09E-02	2.67E-03	8.32E-02	1.47E-01	5.15E+01	<1	1.46E+02	<1
Mercury	4.90E-01	0.00E+00	0.00E+00	0.00E+00	5.61E-03	5.61E-03	0.00E+00	4.12E-04	6.02E-03	1.41E+00	<1	1.41E+01	<1
Nickel	1.64E+01	0.00E+00	0.00E+00	0.00E+00	8.65E-02	8.65E-02	0.00E+00	1.38E-02	1.00E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	0.00E+00	0.00E+00	1.81E-02	1.81E-02	0.00E+00	6.58E-04	1.87E-02	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	0.00E+00	0.00E+00	4.54E-02	4.54E-02	0.00E+00	7.59E-03	5.30E-02	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-04	0.00E+00	1.99E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.20E+02	0.00E+00	0.00E+00	0.00E+00	3.31E+00	3.31E+00	0.00E+00	1.01E-01	3.41E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.25E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-03	1.89E-03	3.18E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.29E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-04	2.77E-04				
Benzo(A)Pyrene	1.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-03	1.44E-03				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	8.41E-06	--	8.41E-06				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	8.41E-06	1.72E-03	1.73E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	0.00E+00	0.00E+00	3.93E-02	3.93E-02	0.00E+00	1.41E-03	4.07E-02	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.26E-02	0.00E+00	0.00E+00	0.00E+00	3.04E-04	3.04E-04	0.00E+00	1.90E-05	3.23E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-14
Refined Exposure Evaluation - North American Wolverine
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H22-15
Refined Exposure Evaluation - Short-tailed Shrew
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	6.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.06E-01	0.00E+00	8.06E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	3.19E+02	7.88E-01	0.00E+00	3.89E+00	0.00E+00	3.89E+00	1.06E-01	4.71E-01	4.47E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	1.75E+00	0.00E+00	0.00E+00	1.73E+00	0.00E+00	1.73E+00	0.00E+00	2.58E-03	1.73E+00	7.70E-01	2.25E+00	6.87E+00	<1
Chromium	1.10E+01	0.00E+00	0.00E+00	4.52E-01	0.00E+00	4.52E-01	0.00E+00	1.62E-02	4.68E-01	2.40E+00	<1	5.82E+01	<1
Cobalt	4.65E+00	0.00E+00	0.00E+00	7.60E-02	0.00E+00	7.60E-02	0.00E+00	6.85E-03	8.29E-02	7.33E+00	<1	1.89E+01	<1
Copper	1.93E+02	4.69E-02	0.00E+00	1.33E+01	0.00E+00	1.33E+01	6.29E-03	2.84E-01	1.36E+01	5.60E+00	2.43E+00	8.27E+01	<1
Lead	4.30E+01	0.00E+00	0.00E+00	2.24E+00	0.00E+00	2.24E+00	0.00E+00	6.34E-02	2.31E+00	4.70E+00	<1	1.86E+02	<1
Manganese	9.88E+01	8.87E-02	0.00E+00	1.37E+00	0.00E+00	1.37E+00	1.19E-02	1.46E-01	1.53E+00	5.15E+01	<1	1.46E+02	<1
Mercury	4.90E-01	0.00E+00	0.00E+00	2.58E-01	0.00E+00	2.58E-01	0.00E+00	7.22E-04	2.59E-01	1.41E+00	<1	1.41E+01	<1
Nickel	1.64E+01	0.00E+00	0.00E+00	1.71E+00	0.00E+00	1.71E+00	0.00E+00	2.42E-02	1.73E+00	1.70E+00	1.02E+00	1.48E+01	<1
Selenium	7.83E-01	0.00E+00	0.00E+00	1.04E-01	0.00E+00	1.04E-01	0.00E+00	1.15E-03	1.05E-01	1.43E-01	<1	6.60E-01	<1
Silver	9.03E+00	0.00E+00	0.00E+00	6.24E-01	0.00E+00	6.24E-01	0.00E+00	1.33E-02	6.37E-01	6.02E+00	<1	1.19E+02	<1
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	6.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.86E-04	0.00E+00	8.86E-04	4.16E+00	<1	9.44E+00	<1
Zinc	1.20E+02	0.00E+00	0.00E+00	5.51E+01	0.00E+00	5.51E+01	0.00E+00	1.77E-01	5.53E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	2.25E+00	4.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-03	3.32E-03	9.06E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	3.29E-01	0.00E+00	0.00E+00	7.02E-02	0.00E+00	7.02E-02	0.00E+00	4.85E-04	7.07E-02				
Benzo(A)Pyrene	1.71E+00	0.00E+00	0.00E+00	3.05E-01	0.00E+00	3.05E-01	0.00E+00	2.52E-03	3.08E-01				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	2.80E-04	--	--	--	0.00E+00	3.75E-05	--	3.75E-05				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						3.75E-01	3.75E-05	3.01E-03	3.78E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	1.68E+00	0.00E+00	0.00E+00	1.22E+01	0.00E+00	1.22E+01	0.00E+00	2.47E-03	1.22E+01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	2.26E-02	0.00E+00	0.00E+00	3.12E-02	0.00E+00	3.12E-02	0.00E+00	3.33E-05	3.12E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H22-15
Refined Exposure Evaluation - Short-tailed Shrew
South Percolation Pond Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	6.83E+00	3.75E-02	2.56E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	9.37E-01	Sample et al. (1999)	Regression ^f	3.78E-02	Sample et al. (1998b)
Barium	NA	2.74E+02	1.56E-01	4.28E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.49E+01	Sample et al. (1998a)	6.83E-04	1.87E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	2.41E+01	Regression ^a	6.83E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.24E+01	Sample et al. (1998a)	Regression ^f	1.22E+01	Sample et al. (1998b)
Lead	NA	1.71E+01	Regression ^a	1.30E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.96E+00	Sample et al. (1999)	Regression ^f	3.79E+00	Sample et al. (1998b)
Manganese	NA	1.35E+03	7.90E-02	1.07E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	6.07E+01	Sample et al. (1999)	2.05E-02	2.77E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.23E+01	Regression ^a	1.46E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.51E+01	Sample et al. (1998a)	Regression ^f	3.95E+00	Sample et al. (1998b)
Selenium	NA	7.88E-01	Regression ^a	3.91E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.79E-01	Sample et al. (1998a)	Regression ^f	6.03E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.49E+01	4.85E-03	7.24E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.27E-01	Sample et al. (1998a)	1.23E-02	1.84E-01	Sample et al. (1998b) ⁱ
Zinc	NA	1.10E+02	Regression ^a	6.53E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.00E+02	Sample et al. (1998a)	Regression ^f	1.09E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	8.32E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											

Table H23-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	7.81E-01	Regression ^a	5.76E-02	USEPA (2007a)	1.59E+00	1.24E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	4.50E-02	2.38E-02	1.07E-03	USEPA (2007a)	5.44E+01	2.45E+00	USEPA (2007a)	7.79E-01	3.51E-02	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	3.90E-02	8.14E-01	3.18E-02	USEPA (2007a)	1.03E+01	4.02E-01	USEPA (2007a)	4.49E-01	1.75E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)

Table H23-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H23-1a
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-0.996	5.44E-01	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H23-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	6.83E+00	3.75E-02	2.56E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	9.37E-01	Sample et al. (1999)	Regression ^f	3.78E-02	Sample et al. (1998b)
Barium	NA	2.74E+02	1.56E-01	4.28E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	2.49E+01	Sample et al. (1998a)	6.83E-04	1.87E-01	Baes et al. (1984) ^e
Beryllium	NA	ND	Regression ^a	0	USEPA (2007)	4.50E-02	0	Sample et al. (1998a)	2.25E-03	0	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	2.41E+01	Regression ^a	6.83E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.24E+01	Sample et al. (1998a)	Regression ^f	1.22E+01	Sample et al. (1998b)
Lead	NA	1.71E+01	Regression ^a	1.30E+00	Bechtel-Jacobs (1998a)	Regression ^d	7.96E+00	Sample et al. (1999)	Regression ^f	3.79E+00	Sample et al. (1998b)
Manganese	NA	1.35E+03	7.90E-02	1.07E+02	Bechtel-Jacobs (1998a) ^g	Regression ^d	6.07E+01	Sample et al. (1999)	2.05E-02	2.77E+01	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	3.23E+01	Regression ^a	1.46E+00	Bechtel-Jacobs (1998a)	7.78E-01	2.51E+01	Sample et al. (1998a)	Regression ^f	3.95E+00	Sample et al. (1998b)
Selenium	NA	7.88E-01	Regression ^a	3.91E-01	Bechtel-Jacobs (1998a)	Regression ^d	7.79E-01	Sample et al. (1998a)	Regression ^f	6.03E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.49E+01	4.85E-03	7.24E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	6.27E-01	Sample et al. (1998a)	1.23E-02	1.84E-01	Sample et al. (1998b) ⁱ
Zinc	NA	1.10E+02	Regression ^a	6.53E+01	Bechtel-Jacobs (1998a)	Regression ^d	4.00E+02	Sample et al. (1998a)	Regression ^f	1.09E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	8.32E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^j
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^j
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h

Table H23-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	7.81E-01	Regression ^a	5.76E-02	USEPA (2007a)	1.59E+00	1.24E+00	USEPA (2007a)	0.00E+00	0.00E+00	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ⁱ
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ⁱ
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ⁱ
Bis(2-ethylhexyl)phthalate	8.39	4.50E-02	2.38E-02	1.07E-03	USEPA (2007a)	5.44E+01	2.45E+00	USEPA (2007a)	7.79E-01	3.51E-02	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ⁱ
Di-n-butyl phthalate	4.61	3.90E-02	8.14E-01	3.18E-02	USEPA (2007a)	1.03E+01	4.02E-01	USEPA (2007a)	4.49E-01	1.75E-02	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ⁱ
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ⁱ
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)

Table H23-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Soil (0-2') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H23-1b
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Cedar Creek Reservoir Overflow Ditch (0 - 2' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-0.996	5.44E-01	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet_{invertebrate}])$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H23-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	3.69E-01	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	1.01E-01	2.74E+02	NA	2.82E+00	---	7.73E+02	Hamilton et al. (2002)
Beryllium	NA	0.00E+00	8.74E-01	NA	1.67E-01	---	1.46E-01	Hamilton et al. (2002)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	0.00E+00	0.00E+00	NA	6.61E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Manganese		7.49E-01	1.35E+03					
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	0.00E+00	3.23E+01	NA	1.34E-01	---	4.33E+00	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)
Vanadium	NA	1.52E-03	1.49E+01	NA	2.50E-01	---	3.73E+00	Hamilton and Buhl (2002)
Zinc	NA	0.00E+00	1.10E+02	NA	8.40E-01	---	9.25E+01	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	0.00E+00	8.32E-01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	6.12E-02	7.04E-01	4.58E+00	---	2.80E-01	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	1.18E-01	6.73E-01	4.37E+00	---	5.18E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	1.30E+00	6.41E-01	4.17E+00	---	5.42E+00	DiToro and McGrath (2000)

Table H23-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	3.93E-02	6.92E-01	4.50E+00	---	1.77E-01	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	2.76E-02	7.45E-01	4.84E+00	---	1.34E-01	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	6.59E-01	6.70E-01	4.36E+00	---	2.87E+00	DiToro and McGrath (2000)
Total LMW PAHs							9.40E+00	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	0.00E+00	7.81E-01	5.56E-01	3.61E+00	---	2.82E+00	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	1.05E+00	5.86E-01	3.81E+00	---	3.99E+00	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	1.05E+00	5.66E-01	3.68E+00	---	3.85E+00	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	5.38E-01	5.77E-01	3.75E+00	---	2.02E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	1.12E+00	6.07E-01	3.94E+00	---	4.40E+00	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	2.26E-01	5.56E-01	3.61E+00	---	8.18E-01	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	9.71E-01	5.55E-01	3.61E+00	---	3.51E+00	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.34E+00	6.50E-01	4.23E+00	---	5.67E+00	DiToro and McGrath (2000)
Total HMW PAHs							2.71E+01	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					

Table H23-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where $BSAF = K_{ow}^{-0.038}$ (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H23-3
Refined Exposure Evaluation - American Dipper
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	6.13E-02	0.00E+00	6.13E-02	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	2.74E+02	1.01E-01	1.28E+02	0.00E+00	1.28E+02	1.68E-02	9.10E-01	1.29E+02	7.35E+01	1.76E+00	1.31E+02	<1
Beryllium	8.74E-01	0.00E+00	2.42E-02	0.00E+00	2.42E-02	0.00E+00	2.90E-03	2.71E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	0.00E+00	1.24E-01	4.48E+00	4.60E+00	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.23E+01	0.00E+00	7.19E-01	0.00E+00	7.19E-01	0.00E+00	1.07E-01	8.26E-01	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.49E+01	1.52E-03	6.19E-01	0.00E+00	6.19E-01	2.52E-04	4.95E-02	6.69E-01	3.44E-01	1.94E+00	1.70E+00	<1
Zinc	1.10E+02	0.00E+00	1.53E+01	0.00E+00	1.53E+01	0.00E+00	3.65E-01	1.57E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-03	2.76E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	6.12E-02	0.00E+00	4.65E-02	0.00E+00	4.65E-02	0.00E+00	2.03E-04	4.67E-02				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.18E-01	0.00E+00	8.59E-02	0.00E+00	8.59E-02	0.00E+00	3.93E-04	8.63E-02				
Fluoranthene	1.30E+00	0.00E+00	8.99E-01	0.00E+00	8.99E-01	0.00E+00	4.32E-03	9.04E-01				
Fluorene	3.93E-02	0.00E+00	2.93E-02	0.00E+00	2.93E-02	0.00E+00	1.30E-04	2.95E-02				
Naphthalene	2.76E-02	0.00E+00	2.22E-02	0.00E+00	2.22E-02	0.00E+00	9.15E-05	2.23E-02				
Phenanthrene	6.59E-01	0.00E+00	4.77E-01	0.00E+00	4.77E-01	0.00E+00	2.19E-03	4.79E-01				
Total LMW PAHs					1.56E+00	0.00E+00	7.32E-03	1.57E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.81E-01	0.00E+00	4.68E-01	0.00E+00	4.68E-01	0.00E+00	2.59E-03	4.71E-01				
Benzo(A)Pyrene	1.05E+00	0.00E+00	6.61E-01	0.00E+00	6.61E-01	0.00E+00	3.47E-03	6.65E-01				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.05E+00	0.00E+00	6.39E-01	0.00E+00	6.39E-01	0.00E+00	3.48E-03	6.42E-01				
Benzo(k)fluoranthene	5.38E-01	0.00E+00	3.34E-01	0.00E+00	3.34E-01	0.00E+00	1.78E-03	3.36E-01				
Chrysene	1.12E+00	0.00E+00	7.30E-01	0.00E+00	7.30E-01	0.00E+00	3.70E-03	7.34E-01				
Dibenz(A,H)Anthracene	2.26E-01	0.00E+00	1.36E-01	0.00E+00	1.36E-01	0.00E+00	7.51E-04	1.37E-01				
Indeno (1,2,3-CD) Pyrene	9.71E-01	0.00E+00	5.82E-01	0.00E+00	5.82E-01	0.00E+00	3.22E-03	5.85E-01				
Pyrene	1.34E+00	0.00E+00	9.40E-01	0.00E+00	9.40E-01	0.00E+00	4.45E-03	9.45E-01				
Total HMW PAHs					4.49E+00	0.00E+00	2.35E-02	4.51E+00	2.00E+00	2.26E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H23-3
Refined Exposure Evaluation - American Dipper
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-4
Refined Exposure Evaluation - American Woodcock
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.34E-02	0.00E+00	4.34E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	6.83E+00	0.00E+00	3.01E-03	9.91E-02	0.00E+00	1.02E-01	0.00E+00	6.02E-02	1.62E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.74E+02	1.01E-01	5.02E-01	2.64E+00	0.00E+00	3.14E+00	1.19E-02	2.42E+00	5.57E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.41E+01	0.00E+00	8.03E-02	1.31E+00	0.00E+00	1.39E+00	0.00E+00	2.12E-01	1.61E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.71E+01	0.00E+00	1.53E-02	8.41E-01	0.00E+00	8.57E-01	0.00E+00	1.51E-01	1.01E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.35E+03	7.49E-01	1.25E+00	6.42E+00	0.00E+00	7.67E+00	8.80E-02	1.19E+01	1.96E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.23E+01	0.00E+00	1.71E-02	2.66E+00	0.00E+00	2.68E+00	0.00E+00	2.85E-01	2.96E+00	6.71E+00	<1	1.86E+01	<1
Selenium	7.88E-01	0.00E+00	4.59E-03	8.24E-02	0.00E+00	8.69E-02	0.00E+00	6.94E-03	9.39E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.49E+01	1.52E-03	8.50E-04	6.63E-02	0.00E+00	6.71E-02	1.78E-04	1.32E-01	1.99E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.10E+02	0.00E+00	7.67E-01	4.23E+01	0.00E+00	4.30E+01	0.00E+00	9.70E-01	4.40E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-03	7.33E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	6.76E-04	1.31E-01	0.00E+00	1.32E-01	0.00E+00	6.88E-03	1.39E-01				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.32E-01	0.00E+00	6.88E-03	1.39E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.26E-05	2.59E-01	0.00E+00	2.59E-01	0.00E+00	3.96E-04	2.59E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	ND	3.73E-04	4.25E-02	0.00E+00	4.29E-02	--	3.44E-04	4.32E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H23-4
Refined Exposure Evaluation - American Woodcock
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-5
Refined Exposure Evaluation - Belted Kingfisher
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	5.82E-02	0.00E+00	5.82E-02	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	2.74E+02	1.01E-01	1.22E+01	0.00E+00	1.22E+01	1.60E-02	0.00E+00	1.22E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	8.74E-01	0.00E+00	2.30E-03	0.00E+00	2.30E-03	0.00E+00	0.00E+00	2.30E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	0.00E+00	1.18E-01	0.00E+00	1.18E-01	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.23E+01	0.00E+00	6.83E-02	0.00E+00	6.83E-02	0.00E+00	0.00E+00	6.83E-02	6.71E+00	<1	1.86E+01	<1
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.49E+01	1.52E-03	5.88E-02	0.00E+00	5.88E-02	2.39E-04	0.00E+00	5.90E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.10E+02	0.00E+00	1.46E+00	0.00E+00	1.46E+00	0.00E+00	0.00E+00	1.46E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics												
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	6.12E-02	0.00E+00	4.41E-03	0.00E+00	4.41E-03	0.00E+00	0.00E+00	4.41E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.18E-01	0.00E+00	8.16E-03	0.00E+00	8.16E-03	0.00E+00	0.00E+00	8.16E-03				
Fluoranthene	1.30E+00	0.00E+00	8.54E-02	0.00E+00	8.54E-02	0.00E+00	0.00E+00	8.54E-02				
Fluorene	3.93E-02	0.00E+00	2.79E-03	0.00E+00	2.79E-03	0.00E+00	0.00E+00	2.79E-03				
Naphthalene	2.76E-02	0.00E+00	2.10E-03	0.00E+00	2.10E-03	0.00E+00	0.00E+00	2.10E-03				
Phenanthrene	6.59E-01	0.00E+00	4.53E-02	0.00E+00	4.53E-02	0.00E+00	0.00E+00	4.53E-02				
Total LMW PAHs					1.48E-01	0.00E+00	0.00E+00	1.48E-01	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.81E-01	0.00E+00	4.45E-02	0.00E+00	4.45E-02	0.00E+00	0.00E+00	4.45E-02				
Benzo(A)Pyrene	1.05E+00	0.00E+00	6.28E-02	0.00E+00	6.28E-02	0.00E+00	0.00E+00	6.28E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.05E+00	0.00E+00	6.07E-02	0.00E+00	6.07E-02	0.00E+00	0.00E+00	6.07E-02				
Benzo(k)fluoranthene	5.38E-01	0.00E+00	3.18E-02	0.00E+00	3.18E-02	0.00E+00	0.00E+00	3.18E-02				
Chrysene	1.12E+00	0.00E+00	6.94E-02	0.00E+00	6.94E-02	0.00E+00	0.00E+00	6.94E-02				
Dibenz(A,H)Anthracene	2.26E-01	0.00E+00	1.29E-02	0.00E+00	1.29E-02	0.00E+00	0.00E+00	1.29E-02				
Indeno (1,2,3-CD) Pyrene	9.71E-01	0.00E+00	5.52E-02	0.00E+00	5.52E-02	0.00E+00	0.00E+00	5.52E-02				
Pyrene	1.34E+00	0.00E+00	8.93E-02	0.00E+00	8.93E-02	0.00E+00	0.00E+00	8.93E-02				
Total HMW PAHs					4.27E-01	0.00E+00	0.00E+00	4.27E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H23-5
Refined Exposure Evaluation - Belted Kingfisher
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-6
Refined Exposure Evaluation - Mourning Dove
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-02	0.00E+00	4.21E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	6.83E+00	0.00E+00	2.92E-02	0.00E+00	0.00E+00	2.92E-02	0.00E+00	5.30E-02	8.22E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.74E+02	1.01E-01	4.88E+00	0.00E+00	0.00E+00	4.88E+00	1.16E-02	2.13E+00	7.02E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.41E+01	0.00E+00	7.80E-01	0.00E+00	0.00E+00	7.80E-01	0.00E+00	1.87E-01	9.67E-01	4.05E+00	<1	3.48E+01	<1
Lead	1.71E+01	0.00E+00	1.49E-01	0.00E+00	0.00E+00	1.49E-01	0.00E+00	1.33E-01	2.82E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.35E+03	7.49E-01	1.22E+01	0.00E+00	0.00E+00	1.22E+01	8.55E-02	1.05E+01	2.27E+01	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.23E+01	0.00E+00	1.66E-01	0.00E+00	0.00E+00	1.66E-01	0.00E+00	2.51E-01	4.17E-01	6.71E+00	<1	1.86E+01	<1
Selenium	7.88E-01	0.00E+00	4.46E-02	0.00E+00	0.00E+00	4.46E-02	0.00E+00	6.11E-03	5.07E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.49E+01	1.52E-03	8.26E-03	0.00E+00	0.00E+00	8.26E-03	1.73E-04	1.16E-01	1.24E-01	3.44E-01	<1	1.70E+00	<1
Zinc	1.10E+02	0.00E+00	7.46E+00	0.00E+00	0.00E+00	7.46E+00	0.00E+00	8.54E-01	8.31E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-03	6.46E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	6.57E-03	0.00E+00	0.00E+00	6.57E-03	0.00E+00	6.06E-03	1.26E-02				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						6.57E-03	0.00E+00	6.06E-03	1.26E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.22E-04	0.00E+00	0.00E+00	1.22E-04	0.00E+00	3.49E-04	4.71E-04	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	3.62E-03	0.00E+00	0.00E+00	3.62E-03	0.00E+00	3.03E-04	3.93E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H23-6
Refined Exposure Evaluation - Mourning Dove
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-7
Refined Exposure Evaluation - Red-tailed Hawk
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.03E-02	0.00E+00	3.03E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	6.83E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-03	3.10E-03	0.00E+00	1.46E-02	1.77E-02	2.24E+00	<1	4.51E+00	<1
Barium	2.74E+02	1.01E-01	0.00E+00	0.00E+00	1.53E-02	1.53E-02	8.32E-03	5.84E-01	6.08E-01	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.41E+01	0.00E+00	0.00E+00	0.00E+00	1.00E+00	1.00E+00	0.00E+00	5.14E-02	1.05E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.71E+01	0.00E+00	0.00E+00	0.00E+00	3.11E-01	3.11E-01	0.00E+00	3.65E-02	3.47E-01	1.63E+00	<1	4.46E+01	<1
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	2.27E+00	2.27E+00	6.15E-02	2.88E+00	5.21E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	0.00E+00	3.24E-01	3.24E-01	0.00E+00	6.89E-02	3.93E-01	6.71E+00	<1	1.86E+01	<1
Selenium	7.88E-01	0.00E+00	0.00E+00	0.00E+00	4.95E-02	4.95E-02	0.00E+00	1.68E-03	5.11E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	0.00E+00	1.51E-02	1.51E-02	1.24E-04	3.18E-02	4.70E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	0.00E+00	8.97E+00	8.97E+00	0.00E+00	2.35E-01	9.21E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E-03	1.77E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-03	1.66E-03				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	1.66E-03	1.66E-03	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	2.87E-03	2.87E-03	0.00E+00	9.60E-05	2.97E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	1.44E-03	1.44E-03	0.00E+00	8.32E-05	1.52E-03	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H23-7
Refined Exposure Evaluation - Red-tailed Hawk
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.85E-02	0.00E+00	5.85E-02	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	6.83E+00	0.00E+00	0.00E+00	1.48E-01	0.00E+00	1.48E-01	0.00E+00	0.00E+00	1.48E-01	2.24E+00	<1	4.51E+00	<1
Barium	2.74E+02	1.01E-01	0.00E+00	3.95E+00	0.00E+00	3.95E+00	1.61E-02	0.00E+00	3.97E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.41E+01	0.00E+00	0.00E+00	1.97E+00	0.00E+00	1.97E+00	0.00E+00	0.00E+00	1.97E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.71E+01	0.00E+00	0.00E+00	1.26E+00	0.00E+00	1.26E+00	0.00E+00	0.00E+00	1.26E+00	1.63E+00	<1	4.46E+01	<1
Manganese	1.35E+03	7.49E-01	0.00E+00	9.61E+00	0.00E+00	9.61E+00	1.19E-01	0.00E+00	9.73E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	3.98E+00	0.00E+00	3.98E+00	0.00E+00	0.00E+00	3.98E+00	6.71E+00	<1	1.86E+01	<1
Selenium	7.88E-01	0.00E+00	0.00E+00	1.23E-01	0.00E+00	1.23E-01	0.00E+00	0.00E+00	1.23E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	9.93E-02	0.00E+00	9.93E-02	2.40E-04	0.00E+00	9.95E-02	3.44E-01	<1	1.70E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	6.33E+01	0.00E+00	6.33E+01	0.00E+00	0.00E+00	6.33E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	1.97E-01	0.00E+00	1.97E-01	0.00E+00	0.00E+00	1.97E-01				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.97E-01	0.00E+00	0.00E+00	1.97E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	3.88E-01	0.00E+00	3.88E-01	0.00E+00	0.00E+00	3.88E-01	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	6.37E-02	0.00E+00	6.37E-02	0.00E+00	0.00E+00	6.37E-02	1.10E-01	<1	1.10E+00	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H23-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-9
Refined Exposure Evaluation - Canada Lynx
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-02	0.00E+00	1.15E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	6.83E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-03	1.18E-03	0.00E+00	5.97E-03	7.16E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.74E+02	1.01E-01	0.00E+00	0.00E+00	5.84E-03	5.84E-03	3.17E-03	2.40E-01	2.49E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.41E+01	0.00E+00	0.00E+00	0.00E+00	3.81E-01	3.81E-01	0.00E+00	2.11E-02	4.02E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.71E+01	0.00E+00	0.00E+00	0.00E+00	1.18E-01	1.18E-01	0.00E+00	1.50E-02	1.33E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	8.64E-01	8.64E-01	2.34E-02	1.18E+00	2.07E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	0.00E+00	1.23E-01	1.23E-01	0.00E+00	2.83E-02	1.52E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.88E-01	0.00E+00	0.00E+00	0.00E+00	1.88E-02	1.88E-02	0.00E+00	6.89E-04	1.95E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	0.00E+00	5.74E-03	5.74E-03	4.74E-05	1.31E-02	1.88E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	0.00E+00	3.42E+00	3.42E+00	0.00E+00	9.63E-02	3.51E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.28E-04	7.28E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.83E-04	6.83E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	6.83E-04	6.83E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	1.10E-03	1.10E-03	0.00E+00	3.94E-05	1.13E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	5.47E-04	5.47E-04	0.00E+00	3.41E-05	5.81E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-9
Refined Exposure Evaluation - Canada Lynx
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-10
Refined Exposure Evaluation - Grizzly Bear
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.97E-03	0.00E+00	7.97E-03	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	6.83E+00	0.00E+00	3.60E-03	3.04E-03	8.17E-05	0.00E+00	6.71E-03	0.00E+00	4.13E-03	1.08E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.74E+02	1.01E-01	6.00E-01	8.08E-02	4.04E-04	0.00E+00	6.81E-01	2.19E-03	1.66E-01	8.49E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.41E+01	0.00E+00	9.59E-02	4.02E-02	2.63E-02	0.00E+00	1.62E-01	0.00E+00	1.46E-02	1.77E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.71E+01	0.00E+00	1.83E-02	2.58E-02	8.18E-03	0.00E+00	5.23E-02	0.00E+00	1.03E-02	6.26E-02	4.70E+00	<1	1.86E+02	<1
Manganese	1.35E+03	7.49E-01	1.50E+00	1.97E-01	5.97E-02	0.00E+00	1.75E+00	1.62E-02	8.16E-01	2.58E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	2.05E-02	8.15E-02	8.52E-03	0.00E+00	1.10E-01	0.00E+00	1.96E-02	1.30E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.88E-01	0.00E+00	5.48E-03	2.52E-03	1.30E-03	0.00E+00	9.31E-03	0.00E+00	4.76E-04	9.78E-03	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	1.02E-03	2.03E-03	3.96E-04	0.00E+00	3.44E-03	3.28E-05	9.03E-03	1.25E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	9.17E-01	1.30E+00	2.36E-01	0.00E+00	2.45E+00	0.00E+00	6.66E-02	2.51E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-04	5.03E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	7.81E-01	0.00E+00	8.08E-04	4.02E-03	0.00E+00	0.00E+00	4.83E-03	0.00E+00	4.72E-04	5.30E-03				
Benzo[A]Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs							4.83E-03	0.00E+00	4.72E-04	5.30E-03	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.50E-05	7.93E-03	7.57E-05	0.00E+00	8.02E-03	0.00E+00	2.72E-05	8.05E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	4.46E-04	1.30E-03	3.78E-05	0.00E+00	1.79E-03	0.00E+00	2.36E-05	1.81E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-10
Refined Exposure Evaluation - Grizzly Bear
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-11
Refined Exposure Evaluation - Long-tailed Weasel
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{Low}	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-02	0.00E+00	1.90E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	6.83E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-03	1.95E-03	0.00E+00	5.62E-03	7.57E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.74E+02	1.01E-01	0.00E+00	0.00E+00	9.63E-03	9.63E-03	5.22E-03	2.26E-01	2.41E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.41E+01	0.00E+00	0.00E+00	0.00E+00	6.28E-01	6.28E-01	0.00E+00	1.98E-02	6.48E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.71E+01	0.00E+00	0.00E+00	0.00E+00	1.95E-01	1.95E-01	0.00E+00	1.41E-02	2.09E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	1.42E+00	1.42E+00	3.86E-02	1.11E+00	2.57E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	0.00E+00	2.03E-01	2.03E-01	0.00E+00	2.66E-02	2.30E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.88E-01	0.00E+00	0.00E+00	0.00E+00	3.10E-02	3.10E-02	0.00E+00	6.49E-04	3.17E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	0.00E+00	9.45E-03	9.45E-03	7.81E-05	1.23E-02	2.18E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	0.00E+00	5.63E+00	5.63E+00	0.00E+00	9.06E-02	5.72E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.85E-04	6.85E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.43E-04	6.43E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	6.43E-04	6.43E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	1.80E-03	1.80E-03	0.00E+00	3.71E-05	1.84E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	9.01E-04	9.01E-04	0.00E+00	3.21E-05	9.33E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-11
Refined Exposure Evaluation - Long-tailed Weasel
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{Low}	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-12
 Refined Exposure Evaluation - Meadow Vole
 Cedar Creek Reservoir Overflow Ditch
 Baseline Ecological Risk Assessment
 Columbia Falls Aluminum Company
 Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.55E-02	0.00E+00	5.55E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	6.83E+00	0.00E+00	3.85E-02	0.00E+00	0.00E+00	3.85E-02	0.00E+00	1.33E-02	5.18E-02	1.04E+00	<1	4.55E+00	<1
Barium	2.74E+02	1.01E-01	6.42E+00	0.00E+00	0.00E+00	6.42E+00	1.52E-02	5.35E-01	6.97E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.41E+01	0.00E+00	1.03E+00	0.00E+00	0.00E+00	1.03E+00	0.00E+00	4.71E-02	1.07E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.71E+01	0.00E+00	1.96E-01	0.00E+00	0.00E+00	1.96E-01	0.00E+00	3.34E-02	2.29E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.35E+03	7.49E-01	1.60E+01	0.00E+00	0.00E+00	1.60E+01	1.13E-01	2.63E+00	1.88E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	2.19E-01	0.00E+00	0.00E+00	2.19E-01	0.00E+00	6.32E-02	2.82E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.88E-01	0.00E+00	5.87E-02	0.00E+00	0.00E+00	5.87E-02	0.00E+00	1.54E-03	6.02E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	1.09E-02	0.00E+00	0.00E+00	1.09E-02	2.28E-04	2.92E-02	4.03E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	9.81E+00	0.00E+00	0.00E+00	9.81E+00	0.00E+00	2.15E-01	1.00E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-03	1.63E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	8.65E-03	0.00E+00	0.00E+00	8.65E-03	0.00E+00	1.53E-03	1.02E-02				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						8.65E-03	0.00E+00	1.53E-03	1.02E-02	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	1.61E-04	0.00E+00	0.00E+00	1.61E-04	0.00E+00	8.79E-05	2.49E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	4.77E-03	0.00E+00	0.00E+00	4.77E-03	0.00E+00	7.62E-05	4.85E-03	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-12
Refined Exposure Evaluation - Meadow Vole
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-13
Refined Exposure Evaluation - Mink
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	1.60E-02	0.00E+00	1.60E-02	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	2.74E+02	1.01E-01	0.00E+00	0.00E+00	0.00E+00	4.39E-03	0.00E+00	4.39E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	8.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	0.00E+00	3.24E-02	0.00E+00	3.24E-02	5.15E+01	<1	1.46E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	0.00E+00	0.00E+00	6.56E-05	0.00E+00	6.56E-05	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E+01	--	6.87E+02	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	6.12E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	1.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	1.30E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	3.93E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	2.76E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	6.59E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(A)Pyrene	1.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	1.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(k)fluoranthene	5.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Dibenz(A,H)Anthracene	2.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	9.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Pyrene	1.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total HMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-13
Refined Exposure Evaluation - Mink
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-14
Refined Exposure Evaluation - North American Wolverine
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
			Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-02	0.00E+00	1.11E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	6.83E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-03	1.14E-03	0.00E+00	5.74E-03	6.88E-03	1.04E+00	<1	4.55E+00	<1
Barium	2.74E+02	1.01E-01	0.00E+00	0.00E+00	5.62E-03	5.62E-03	3.05E-03	2.31E-01	2.39E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.41E+01	0.00E+00	0.00E+00	0.00E+00	3.67E-01	3.67E-01	0.00E+00	2.03E-02	3.87E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.71E+01	0.00E+00	0.00E+00	0.00E+00	1.14E-01	1.14E-01	0.00E+00	1.44E-02	1.28E-01	4.70E+00	<1	1.86E+02	<1
Manganese	1.35E+03	7.49E-01	0.00E+00	0.00E+00	8.31E-01	8.31E-01	2.25E-02	1.13E+00	1.99E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	0.00E+00	1.19E-01	1.19E-01	0.00E+00	2.72E-02	1.46E-01	1.70E+00	<1	1.48E+01	<1
Selenium	7.88E-01	0.00E+00	0.00E+00	0.00E+00	1.81E-02	1.81E-02	0.00E+00	6.63E-04	1.88E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	0.00E+00	5.52E-03	5.52E-03	4.56E-05	1.26E-02	1.81E-02	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	0.00E+00	3.29E+00	3.29E+00	0.00E+00	9.26E-02	3.38E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-04	7.00E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.57E-04	6.57E-04				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	6.57E-04	6.57E-04	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	0.00E+00	1.05E-03	1.05E-03	0.00E+00	3.79E-05	1.09E-03	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	0.00E+00	5.26E-04	5.26E-04	0.00E+00	3.28E-05	5.59E-04	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-14
Refined Exposure Evaluation - North American Wolverine
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H23-15
Refined Exposure Evaluation - Short-tailed Shrew
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.95E-02	0.00E+00	4.95E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	6.83E+00	0.00E+00	0.00E+00	1.26E-01	0.00E+00	1.26E-01	0.00E+00	1.01E-02	1.36E-01	1.04E+00	<1	4.55E+00	<1
Barium	2.74E+02	1.01E-01	0.00E+00	3.34E+00	0.00E+00	3.34E+00	1.36E-02	4.04E-01	3.76E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.41E+01	0.00E+00	0.00E+00	1.66E+00	0.00E+00	1.66E+00	0.00E+00	3.55E-02	1.70E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.71E+01	0.00E+00	0.00E+00	1.07E+00	0.00E+00	1.07E+00	0.00E+00	2.52E-02	1.09E+00	4.70E+00	<1	1.86E+02	<1
Manganese	1.35E+03	7.49E-01	0.00E+00	8.14E+00	0.00E+00	8.14E+00	1.00E-01	1.99E+00	1.02E+01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	3.23E+01	0.00E+00	0.00E+00	3.37E+00	0.00E+00	3.37E+00	0.00E+00	4.77E-02	3.42E+00	1.70E+00	2.01E+00	1.48E+01	<1
Selenium	7.88E-01	0.00E+00	0.00E+00	1.04E-01	0.00E+00	1.04E-01	0.00E+00	1.16E-03	1.06E-01	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.49E+01	1.52E-03	0.00E+00	8.40E-02	0.00E+00	8.40E-02	2.03E-04	2.20E-02	1.06E-01	4.16E+00	<1	9.44E+00	<1
Zinc	1.10E+02	0.00E+00	0.00E+00	5.36E+01	0.00E+00	5.36E+01	0.00E+00	1.62E-01	5.37E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	8.32E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	1.23E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.81E-01	0.00E+00	0.00E+00	1.66E-01	0.00E+00	1.66E-01	0.00E+00	1.15E-03	1.68E-01				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						1.66E-01	0.00E+00	1.15E-03	1.68E-01	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	4.50E-02	0.00E+00	0.00E+00	3.28E-01	0.00E+00	3.28E-01	0.00E+00	6.63E-05	3.28E-01	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	3.90E-02	0.00E+00	0.00E+00	5.39E-02	0.00E+00	5.39E-02	0.00E+00	5.75E-05	5.40E-02	5.50E+02	<1	1.83E+03	<1
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H23-15
Refined Exposure Evaluation - Short-tailed Shrew
Cedar Creek Reservoir Overflow Ditch
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-1
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Inorganics - Metals											
Aluminum	NA	0.00E+00	8.00E-04	0.00E+00	Baes et al. (1984)	5.30E-02	0.00E+00	Sample et al. (1998a)	6.00E-06	0.00E+00	Baes et al. (1984) ^e
Antimony	NA	ND	Regression ^a	0	USEPA (2007)	1.00E+00	0	Assumption ^c	5.00E-02	0	Baes et al. (1984) ^e
Arsenic	NA	9.33E+00	3.75E-02	3.50E-01	Bechtel-Jacobs (1998a) ^g	Regression ^d	1.17E+00	Sample et al. (1999)	Regression ^f	4.89E-02	Sample et al. (1998b)
Barium	NA	5.86E+02	1.56E-01	9.15E+01	Bechtel-Jacobs (1998a) ^g	9.10E-02	5.34E+01	Sample et al. (1998a)	6.83E-04	4.00E-01	Baes et al. (1984) ^e
Beryllium	NA	0.00E+00	Regression ^a	0.00E+00	USEPA (2007)	4.50E-02	0.00E+00	Sample et al. (1998a)	2.25E-03	0.00E+00	Baes et al. (1984) ^e
Cadmium	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	Regression ^d	0	Sample et al. (1999)	Regression ^f	0	Sample et al. (1998b)
Chromium	NA	ND	4.10E-02	0	Bechtel-Jacobs (1998a) ^g	3.06E-01	0	Sample et al. (1998a)	Regression ^f	0	Sample et al. (1998b)
Cobalt	NA	0.00E+00	7.50E-03	0.00E+00	Bechtel-Jacobs (1998a) ^g	1.22E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Copper	NA	2.61E+01	Regression ^a	7.05E+00	Bechtel-Jacobs (1998a)	5.15E-01	1.34E+01	Sample et al. (1998a)	Regression ^f	1.23E+01	Sample et al. (1998b)
Lead	NA	1.35E+01	Regression ^a	1.14E+00	Bechtel-Jacobs (1998a)	Regression ^d	6.56E+00	Sample et al. (1999)	Regression ^f	3.41E+00	Sample et al. (1998b)
Manganese	NA	4.80E+02	7.90E-02	3.79E+01	Bechtel-Jacobs (1998a) ^g	Regression ^d	3.00E+01	Sample et al. (1999)	2.05E-02	9.84E+00	Sample et al. (1998b) ⁱ
Mercury	NA	ND	Regression ^a	0	Bechtel-Jacobs (1998a)	3.93E+00	0	Sample et al. (1998a)	3.81E-01	0	LANL (2015)
Nickel	NA	0.00E+00	Regression ^a	0.00E+00	Bechtel-Jacobs (1998a)	7.78E-01	0.00E+00	Sample et al. (1998a)	Regression ^f	0.00E+00	Sample et al. (1998b)
Selenium	NA	1.62E+00	Regression ^a	8.64E-01	Bechtel-Jacobs (1998a)	Regression ^d	1.32E+00	Sample et al. (1998a)	Regression ^f	7.91E-01	Sample et al. (1998b)
Silver		ND	1.40E-02	0	Bechtel-Jacobs (1998a)m	2.05E+00	0	Sample et al. (1998a)	4.00E-03	0	Sample et al. (1998b)
Thallium	NA	ND	4.00E-03	0	Baes et al. (1984)	5.41E-02	0	USCHPPM (2004)	1.08E-01	0	Baes et al. (1984) ^e
Vanadium	NA	1.29E+01	4.85E-03	6.28E-02	Bechtel-Jacobs (1998a) ^g	4.20E-02	5.44E-01	Sample et al. (1998a)	1.23E-02	1.59E-01	Sample et al. (1998b) ⁱ
Zinc	NA	4.31E+01	Regression ^a	3.89E+01	Bechtel-Jacobs (1998a)	Regression ^d	2.94E+02	Sample et al. (1998a)	Regression ^f	1.02E+02	Sample et al. (1998b)
Inorganics - Other Inorganics											
Cyanide	NA	4.11E-01	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	ND	6.00E-02	0	Baes et al. (1984)	1.24E-01	0	USCHPPM (2004)	1.60E-02	0	LANL (2015)
Polychlorinated Biphenyls (PCBs)											
Aroclor 1248	6.34	ND	1.62E-01	0	USEPA (2007a)	2.21E+01	0	USEPA (2007a)	2.76E-01	0	Calculated ^d
Aroclor 1254	6.98	ND	8.90E-02	0	USEPA (2007a)	2.92E+01	0	USEPA (2007a)	2.53E-01	0	Calculated ^d
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)											
Low Molecular Weight (LMW) PAHs:											
Acenaphthene	3.92	ND	Regression ^a	0	USEPA (2007a)	1.47E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Acenaphthylene	4.07	ND	Regression ^a	0	USEPA (2007a)	2.29E+01	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Anthracene	4.55	ND	Regression ^a	0	USEPA (2007a)	2.42E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluoranthene	4.95	ND	5.00E-01	0	USEPA (2007a)	3.04E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Fluorene	4.18	ND	Regression ^a	0	USEPA (2007a)	9.57E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Naphthalene	3.36	ND	1.22E+01	0	USEPA (2007a)	4.40E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Phenanthrene	4.55	ND	Regression ^a	0	USEPA (2007a)	1.72E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
LMW PAHs											

Table H24-1
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
High Molecular Weight (HMW) PAHs:											
Benzo(a)anthracene	5.7	ND	Regression ^a	0	USEPA (2007a)	1.59E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo[A]Pyrene	6.11	ND	Regression ^a	0	USEPA (2007a)	1.33E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(b)fluoranthene	6.2	ND	3.10E-01	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(g,h,i)perylene	6.7	ND	Regression ^a	0	USEPA (2007a)	2.94E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Benzo(k)fluoranthene	6.2	ND	Regression ^a	0	USEPA (2007a)	2.60E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Chrysene	5.7	ND	Regression ^a	0	USEPA (2007a)	2.29E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Dibenz(a,h)anthracene	6.69	ND	1.30E-01	0	USEPA (2007a)	2.31E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Indeno (1,2,3-CD) Pyrene	6.58	ND	1.10E-01	0	USEPA (2007a)	2.86E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
Pyrene	4.88	ND	7.20E-01	0	USEPA (2007a)	1.75E+00	0	USEPA (2007a)	0.00E+00	0	USEPA (2007a) ^h
HMW PAHs											
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs											
1,2,4,5-Tetrachlorobenzene	4.57	ND	8.44E-01	0	USEPA (2007a)	1.01E+01	0	USEPA (2007a)	1.33E-01	0	Calculated ^d
2,3,4,6-Tetrachlorophenol		ND									
2-Chloronaphthalene	3.81	ND	1.71E+00	0	USEPA (2007a)	7.27E+00	0	USEPA (2007a)	6.32E-02	0	Calculated ^d
Biphenyl (Diphenyl)	3.76	ND	1.80E+00	0	USEPA (2007a)	7.10E+00	0	USEPA (2007a)	5.93E-02	0	Calculated ^d
Bis(2-ethylhexyl)phthalate	8.39	ND	2.38E-02	0	USEPA (2007a)	5.44E+01	0	USEPA (2007a)	7.79E-01	0	LANL (2015)
Butylbenzylphthalate	4.84	ND	6.54E-01	0	USEPA (2007a)	1.14E+01	0	USEPA (2007a)	1.22E-01	0	LANL (2015)
Dibenzofuran	3.71	ND	1.88E+00	0	USEPA (2007a)	6.96E+00	0	USEPA (2007a)	5.60E-02	0	Calculated ^d
Di-n-butyl phthalate	4.61	ND	8.14E-01	0	USEPA (2007a)	1.03E+01	0	USEPA (2007a)	4.49E-01	0	LANL (2015)
Di-n-octyl phthalate	8.54	ND	2.07E-02	0	USEPA (2007a)	5.81E+01	0	USEPA (2007a)	1.03E+00	0	LANL (2015)
Hexachlorobenzene	5.86	ND	2.53E-01	0	USEPA (2007a)	1.79E+01	0	USEPA (2007a)	2.65E+00	0	LANL (2015)
Hexachlorobutadiene	4.72	ND	7.37E-01	0	USEPA (2007a)	1.08E+01	0	USEPA (2007a)	1.49E-01	0	Calculated ^d
Hexachloroethane	4.03	ND	1.39E+00	0	USEPA (2007a)	8.01E+00	0	USEPA (2007a)	8.07E-02	0	Calculated ^d
Pentachlorophenol	4.74	ND	5.93E+00	0	USEPA (2007a)	1.09E+01	0	USEPA (2007a)	Regression ^g	0	USEPA (2007a)
Volatile Organic Compounds (VOCs)											
Methylcyclohexane	3.59	ND	2.11E+00	0	USEPA (2007a)	6.59E+00	0	USEPA (2007a)	4.82E-02	0	LANL (2015)

Table H24-1
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Shallow Soil (0-0.5') Exposure Point Concentration (mg/kg, dry weight)	Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight)								
			Plants			Soil Invertebrates			Small Mammals		
			Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference	Bioaccumulation Factor (BAF)	Estimated Concentration	BAF Reference
Dioxin/Furans											
2,3,7,8-TCDD	6.92	ND	9.41E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8-PeCDD	7.56	ND	5.17E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,6,7,8-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,7,8,9-HxCDD	8.21	ND	2.82E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
1,2,3,4,6,7,8-HpCDD	8.85	ND	1.55E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
OCDD	9.50	ND	8.45E-03	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	Regression ^h	0	Sample et al. (1998b)
2,3,7,8-TCDF	6.29	ND	1.69E-01	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,7,8-PeCDF	6.94	ND	9.24E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
2,3,4,6,7,8-HxCDF	7.92	ND	3.70E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,7,8,9-HxCDF	7.58	ND	5.08E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,6,7,8-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
1,2,3,4,7,8,9-HpCDF	8.23	ND	2.77E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ
OCDF	8.87	ND	1.52E-02	0	USEPA (2007a) ^b	Regression ^d	0	Sample et al. (1998a)	1.25E-01	0	Sample et al. (1998b) ⁱ

Table H24-1
Estimated Concentrations in Dietary Items of Terrestrial Receptors - Northern Surface Water Feature (0 - 0.5' Interval)
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

a, Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$. Slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Antimony	-3.233	9.38E-01	USEPA (2007)
Beryllium	-0.5361	7.35E-01	USEPA (2007)
Cadmium	-0.475	5.46E-01	Bechtel-Jacobs (1998)
Copper	0.668	3.94E-01	Bechtel-Jacobs (1998)
Lead	-1.328	5.61E-01	Bechtel-Jacobs (1998)
Mercury	-0.996	5.44E-01	Bechtel-Jacobs (1998)
Nickel	-2.223	7.48E-01	Bechtel-Jacobs (1998)
Selenium	-0.677	1.10E+00	Bechtel-Jacobs (1998)
Zinc	1.575	5.54E-01	Bechtel-Jacobs (1998)
Acenaphthene	-5.562	-8.56E-01	USEPA (2007)
Acenaphthylene	-1.144	7.91E-01	USEPA (2007)
Anthracene	-0.9887	7.78E-01	USEPA (2007)
Benzo(a)anthracene	-2.7078	5.94E-01	USEPA (2007)
Benzo(a)pyrene	-2.0615	9.75E-01	USEPA (2007)
Benzo(g,h,i)perylene	-0.9313	1.18E+00	USEPA (2007)
Benzo(k)fluoranthene	-2.1579	8.60E-01	USEPA (2007)
Chrysene	-2.7078	5.94E-01	USEPA (2007)
Fluorene	-5.562	-8.56E-01	USEPA (2007)
Phenanthrene	-0.1665	6.20E-01	USEPA (2007)

b, Soil-to-plant BAF based on K_{ow} model for non-ionic organic compounds (rinsed foliage data) provided in USEPA (2005), where: $\log BAF = -0.4057(\log K_{ow}) + 1.781$; $\log K_{ow}$ values obtained from EPA EpiSuite V. 1.69, KOWWIN module.

c, Soil-invertebrate bioaccumulation factor could not be identified; therefore, a conservative default accumulation factor of 1.0 was assumed.

d, Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-1.421	7.06E-01	Sample et al. (1999)
Cadmium	2.114	7.95E-01	Sample et al. (1999)
Lead	-0.218	8.07E-01	Sample et al. (1999)
Manganese	-0.809	6.82E-01	Sample et al. (1999)
Selenium	-0.075	7.33E-01	Sample et al. (1999)
Zinc	4.449	3.28E-01	Sample et al. (1999)
2,3,7,8-TCDD	3.533	1.18E+00	Sample et al. (1998a)

e, Bioaccumulation factor estimated as the product of the soil-plant and ingestion-beef factors reported in Baes et al. (1984)

f, Median soil-to-plant uptake factors reported in Bechtel (1998a) were used as bioaccumulation factors.

f, Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where $\ln([tissue]) = B0 + B1(\ln[soil])$ and slopes (B1) and intercepts (B0) are as follows:

Analyte	B0	B1	Data Source
Arsenic	-4.8471	8.19E-01	Sample et al. (1998b)
Cadmium	-1.2571	4.72E-01	Sample et al. (1998b)
Chromium	-1.4599	7.34E-01	Sample et al. (1998b)
Cobalt	-4.4669	1.31E+00	Sample et al. (1998b)
Copper	2.042	1.44E-01	Sample et al. (1998b)
Lead	0.0761	4.42E-01	Sample et al. (1998b)
Nickel	-0.2462	4.66E-01	Sample et al. (1998b)
Selenium	-0.4158	3.76E-01	Sample et al. (1998b)
Zinc	4.3632	7.06E-02	Sample et al. (1998b)
2,3,7,8-TCDD	0.8113	1.10E+00	Sample et al. (1998b)

g, Pentachlorophenol concentration in small mammal tissue (mg/kg dry weight) calculated based on regression models, where $[tissue] = 0.198 + 0.00452([diet]_{invertebrate})$

h, USEPA (2005) assumes bioaccumulation of PAHs by birds and mammals is minimal due to rapid metabolism of these compounds after ingestion.

i, Small mammal tissue estimated based on the medial BAF for the general model presented in Sample et al. (1998b)

j, No value was identified in the literature. Soil-to-small mammal BF estimated based on the approach presented in Table 5, consistent with LANL (2017).

Table H24-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Metals								
Aluminum	NA	2.71E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)
Arsenic	NA	0.00E+00	9.33E+00	NA	3.73E-01	---	3.48E+00	Bechtel-Jacobs (1998b) ^c
Barium	NA	1.47E-01	5.86E+02	NA	2.82E+00	---	1.65E+03	Hamilton et al. (2002)
Beryllium	NA	0.00E+00	7.63E-01	NA	1.67E-01	---	1.27E-01	Hamilton et al. (2002)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Cobalt		0.00E+00	0.00E+00					
Copper	NA	0.00E+00	2.61E+01	NA	6.61E-01	---	1.72E+01	Bechtel-Jacobs (1998b) ^c
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Manganese		5.21E-02	4.80E+02					
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c
Nickel	NA	0.00E+00	0.00E+00	NA	1.34E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Selenium	NA	0.00E+00	1.62E+00	NA	3.75E+00	---	6.06E+00	Hamilton et al. (2002)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)
Vanadium	NA	2.20E-03	1.29E+01	NA	2.50E-01	---	3.24E+00	Hamilton and Buhl (2002)
Zinc	NA	0.00E+00	0.00E+00	NA	8.40E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c
Inorganics - Other Inorganics								
Cyanide	NA	0.00E+00	4.11E-01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)
Polychlorinated Biphenyls (PCBs)								
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)								
Low Molecular Weight (LMW) PAHs:								
Acenaphthene	4.01	0.00E+00	0.00E+00	7.04E-01	4.58E+00	---	0.00E+00	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	0.00E+00	6.73E-01	4.37E+00	---	0.00E+00	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	9.30E-02	6.41E-01	4.17E+00	---	3.88E-01	DiToro and McGrath (2000)

Table H24-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	0.00E+00	6.92E-01	4.50E+00	---	0.00E+00	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	5.19E-02	6.70E-01	4.36E+00	---	2.26E-01	DiToro and McGrath (2000)
Total LMW PAHs							6.14E-01	
High Molecular Weight (HMW) PAHs:								
Benzo(a)anthracene	6.71	0.00E+00	4.94E-02	5.56E-01	3.61E+00	---	1.78E-01	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	6.36E-02	5.86E-01	3.81E+00	---	2.42E-01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	6.50E-02	5.66E-01	3.68E+00	---	2.39E-01	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	0.00E+00	5.77E-01	3.75E+00	---	0.00E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	9.77E-02	6.07E-01	3.94E+00	---	3.85E-01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	1.31E-02	5.56E-01	3.61E+00	---	4.74E-02	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	5.23E-02	5.55E-01	3.61E+00	---	1.89E-01	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	8.06E-02	6.50E-01	4.23E+00	---	3.41E-01	DiToro and McGrath (2000)
Total HMW PAHs							1.62E+00	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs								
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00					
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00					
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00					
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)								
Methylcyclohexane		0.00E+00	0.00E+00					

Table H24-2
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)			
					Aquatic Life Stage Benthic Invertebrates			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans								
2,3,7,8-TCDD		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00					
OCDD		0.00E+00	0.00E+00					
2,3,7,8-TCDF		0.00E+00	0.00E+00					
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00					
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00					
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00					
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00					
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00					
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00					
OCDF		0.00E+00	0.00E+00					

Notes:
NA, Normalized BSAF was not applicable for metals
a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)
b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:
$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)
f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)
f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)
c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H24-3
Refined Exposure Evaluation - American Dipper
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	0.00E+00	4.50E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	9.33E+00	0.00E+00	5.78E-01	0.00E+00	5.78E-01	0.00E+00	3.10E-02	6.09E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.86E+02	1.47E-01	2.74E+02	0.00E+00	2.74E+02	2.43E-02	1.95E+00	2.76E+02	7.35E+01	3.76E+00	1.31E+02	2.11E+00
Beryllium	7.63E-01	0.00E+00	2.12E-02	0.00E+00	2.12E-02	0.00E+00	2.53E-03	2.37E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.61E+01	0.00E+00	2.86E+00	0.00E+00	2.86E+00	0.00E+00	8.65E-02	2.95E+00	4.05E+00	<1	3.48E+01	<1
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	0.00E+00	8.64E-03	1.59E+00	1.60E+00	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	1.62E+00	0.00E+00	1.01E+00	0.00E+00	1.01E+00	0.00E+00	5.37E-03	1.01E+00	2.90E-01	3.49E+00	8.20E-01	1.23E+00
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.29E+01	2.20E-03	5.37E-01	0.00E+00	5.37E-01	3.65E-04	4.30E-02	5.80E-01	3.44E-01	1.69E+00	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-03	1.36E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	9.30E-02	0.00E+00	6.43E-02	0.00E+00	6.43E-02	0.00E+00	3.09E-04	6.46E-02				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	5.19E-02	0.00E+00	3.75E-02	0.00E+00	3.75E-02	0.00E+00	1.72E-04	3.77E-02				
Total LMW PAHs					1.02E-01	0.00E+00	4.81E-04	1.02E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	4.94E-02	0.00E+00	2.96E-02	0.00E+00	2.96E-02	0.00E+00	1.64E-04	2.98E-02				
Benzo(A)Pyrene	6.36E-02	0.00E+00	4.02E-02	0.00E+00	4.02E-02	0.00E+00	2.11E-04	4.04E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	6.50E-02	0.00E+00	3.97E-02	0.00E+00	3.97E-02	0.00E+00	2.16E-04	3.99E-02				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	9.77E-02	0.00E+00	6.39E-02	0.00E+00	6.39E-02	0.00E+00	3.24E-04	6.43E-02				
Dibenz(A,H)Anthracene	1.31E-02	0.00E+00	7.87E-03	0.00E+00	7.87E-03	0.00E+00	4.36E-05	7.91E-03				
Indeno (1,2,3-CD) Pyrene	5.23E-02	0.00E+00	3.14E-02	0.00E+00	3.14E-02	0.00E+00	1.74E-04	3.15E-02				
Pyrene	8.06E-02	0.00E+00	5.65E-02	0.00E+00	5.65E-02	0.00E+00	2.67E-04	5.68E-02				
Total HMW PAHs					2.69E-01	0.00E+00	1.40E-03	2.71E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H24-3
Refined Exposure Evaluation - American Dipper
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-4
Refined Exposure Evaluation - American Woodcock
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-01	0.00E+00	3.19E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	9.33E+00	0.00E+00	4.11E-03	1.24E-01	0.00E+00	1.28E-01	0.00E+00	8.22E-02	2.10E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.86E+02	1.47E-01	1.07E+00	5.64E+00	0.00E+00	6.72E+00	1.72E-02	5.17E+00	1.19E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.61E+01	0.00E+00	8.28E-02	1.42E+00	0.00E+00	1.50E+00	0.00E+00	2.30E-01	1.73E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.35E+01	0.00E+00	1.34E-02	6.94E-01	0.00E+00	7.07E-01	0.00E+00	1.19E-01	8.26E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.80E+02	5.21E-02	4.45E-01	3.17E+00	0.00E+00	3.62E+00	6.12E-03	4.23E+00	7.85E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	1.62E+00	0.00E+00	1.01E-02	1.40E-01	0.00E+00	1.50E-01	0.00E+00	1.42E-02	1.64E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.29E+01	2.20E-03	7.38E-04	5.75E-02	0.00E+00	5.82E-02	2.58E-04	1.14E-01	1.73E-01	3.44E-01	<1	1.70E+00	<1
Zinc	4.31E+01	0.00E+00	4.57E-01	3.11E+01	0.00E+00	3.15E+01	0.00E+00	3.80E-01	3.19E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-03	3.62E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	ND	--	--	--	0.00E+00	--	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H24-4
Refined Exposure Evaluation - American Woodcock
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Woodcock Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-5
Refined Exposure Evaluation - Belted Kingfisher
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-01	0.00E+00	4.27E-01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	9.33E+00	0.00E+00	5.49E-02	0.00E+00	5.49E-02	0.00E+00	0.00E+00	5.49E-02	2.24E+00	<1	4.51E+00	<1
Barium	5.86E+02	1.47E-01	2.61E+01	0.00E+00	2.61E+01	2.31E-02	0.00E+00	2.61E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	7.63E-01	0.00E+00	2.01E-03	0.00E+00	2.01E-03	0.00E+00	0.00E+00	2.01E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.61E+01	0.00E+00	2.72E-01	0.00E+00	2.72E-01	0.00E+00	0.00E+00	2.72E-01	4.05E+00	<1	3.48E+01	<1
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	0.00E+00	8.21E-03	0.00E+00	8.21E-03	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	1.62E+00	0.00E+00	9.56E-02	0.00E+00	9.56E-02	0.00E+00	0.00E+00	9.56E-02	2.90E-01	<1	8.20E-01	<1
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.29E+01	2.20E-03	5.10E-02	0.00E+00	5.10E-02	3.47E-04	0.00E+00	5.14E-02	3.44E-01	<1	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	9.30E-02	0.00E+00	6.11E-03	0.00E+00	6.11E-03	0.00E+00	0.00E+00	6.11E-03				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	5.19E-02	0.00E+00	3.56E-03	0.00E+00	3.56E-03	0.00E+00	0.00E+00	3.56E-03				
Total LMW PAHs					9.67E-03	0.00E+00	0.00E+00	9.67E-03	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	4.94E-02	0.00E+00	2.81E-03	0.00E+00	2.81E-03	0.00E+00	0.00E+00	2.81E-03				
Benzo(A)Pyrene	6.36E-02	0.00E+00	3.82E-03	0.00E+00	3.82E-03	0.00E+00	0.00E+00	3.82E-03				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	6.50E-02	0.00E+00	3.77E-03	0.00E+00	3.77E-03	0.00E+00	0.00E+00	3.77E-03				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	9.77E-02	0.00E+00	6.07E-03	0.00E+00	6.07E-03	0.00E+00	0.00E+00	6.07E-03				
Dibenz(A,H)Anthracene	1.31E-02	0.00E+00	7.47E-04	0.00E+00	7.47E-04	0.00E+00	0.00E+00	7.47E-04				
Indeno (1,2,3-CD) Pyrene	5.23E-02	0.00E+00	2.98E-03	0.00E+00	2.98E-03	0.00E+00	0.00E+00	2.98E-03				
Pyrene	8.06E-02	0.00E+00	5.37E-03	0.00E+00	5.37E-03	0.00E+00	0.00E+00	5.37E-03				
Total HMW PAHs					2.56E-02	0.00E+00	0.00E+00	2.56E-02	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H24-5
Refined Exposure Evaluation - Belted Kingfisher
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-6
Refined Exposure Evaluation - Mourning Dove
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)												
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-01	0.00E+00	3.10E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	9.33E+00	0.00E+00	4.00E-02	0.00E+00	0.00E+00	4.00E-02	0.00E+00	7.24E-02	1.12E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.86E+02	1.47E-01	1.04E+01	0.00E+00	0.00E+00	1.04E+01	1.67E-02	4.55E+00	1.50E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.61E+01	0.00E+00	8.05E-01	0.00E+00	0.00E+00	8.05E-01	0.00E+00	2.02E-01	1.01E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.35E+01	0.00E+00	1.30E-01	0.00E+00	0.00E+00	1.30E-01	0.00E+00	1.05E-01	2.35E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.80E+02	5.21E-02	4.33E+00	0.00E+00	0.00E+00	4.33E+00	5.94E-03	3.72E+00	8.06E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	1.62E+00	0.00E+00	9.86E-02	0.00E+00	0.00E+00	9.86E-02	0.00E+00	1.25E-02	1.11E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.29E+01	2.20E-03	7.17E-03	0.00E+00	0.00E+00	7.17E-03	2.51E-04	1.01E-01	1.08E-01	3.44E-01	<1	1.70E+00	<1
Zinc	4.31E+01	0.00E+00	4.44E+00	0.00E+00	0.00E+00	4.44E+00	0.00E+00	3.35E-01	4.77E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-03	3.19E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H24-6
Refined Exposure Evaluation - Mourning Dove
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mourning Dove Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-7
Refined Exposure Evaluation - Red-tailed Hawk
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-01	0.00E+00	2.22E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-03	4.01E-03	0.00E+00	1.99E-02	2.39E-02	2.24E+00	<1	4.51E+00	<1
Barium	5.86E+02	1.47E-01	0.00E+00	0.00E+00	3.28E-02	3.28E-02	1.20E-02	1.25E+00	1.30E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	0.00E+00	1.01E+00	1.01E+00	0.00E+00	5.56E-02	1.07E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.35E+01	0.00E+00	0.00E+00	0.00E+00	2.80E-01	2.80E-01	0.00E+00	2.88E-02	3.08E-01	1.63E+00	<1	4.46E+01	<1
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	8.07E-01	8.07E-01	4.27E-03	1.02E+00	1.83E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	0.00E+00	6.48E-02	6.48E-02	0.00E+00	3.45E-03	6.83E-02	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	0.00E+00	1.31E-02	1.31E-02	1.80E-04	2.76E-02	4.09E-02	3.44E-01	<1	1.70E+00	<1
Zinc	4.31E+01	0.00E+00	0.00E+00	0.00E+00	8.40E+00	8.40E+00	0.00E+00	9.20E-02	8.49E+00	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.77E-04	8.77E-04	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H24-7
Refined Exposure Evaluation - Red-tailed Hawk
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Red-tailed Hawk Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}							
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)											
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.29E-01	0.00E+00	4.29E-01	1.10E+02	<1	1.10E+03	<1
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	1.85E-01	0.00E+00	1.85E-01	0.00E+00	0.00E+00	1.85E-01	2.24E+00	<1	4.51E+00	<1
Barium	5.86E+02	1.47E-01	0.00E+00	8.45E+00	0.00E+00	8.45E+00	2.32E-02	0.00E+00	8.47E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	2.13E+00	0.00E+00	2.13E+00	0.00E+00	0.00E+00	2.13E+00	4.05E+00	<1	3.48E+01	<1
Lead	1.35E+01	0.00E+00	0.00E+00	1.04E+00	0.00E+00	1.04E+00	0.00E+00	0.00E+00	1.04E+00	1.63E+00	<1	4.46E+01	<1
Manganese	4.80E+02	5.21E-02	0.00E+00	4.75E+00	0.00E+00	4.75E+00	8.25E-03	0.00E+00	4.76E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	2.09E-01	0.00E+00	2.09E-01	0.00E+00	0.00E+00	2.09E-01	2.90E-01	<1	8.20E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	8.61E-02	0.00E+00	8.61E-02	3.48E-04	0.00E+00	8.65E-02	3.44E-01	<1	1.70E+00	<1
Zinc	4.31E+01	0.00E+00	0.00E+00	4.66E+01	0.00E+00	4.66E+01	0.00E+00	0.00E+00	4.66E+01	6.61E+01	<1	1.71E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.00E-02	--	4.00E-01	--
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+01	--	1.61E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+00	--	2.00E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H24-8
Refined Exposure Evaluation - Yellow-billed Cuckoo
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Yellow-billed Cuckoo Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-9
Refined Exposure Evaluation - Canada Lynx
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.48E-02	0.00E+00	8.48E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-03	1.53E-03	0.00E+00	8.17E-03	9.69E-03	1.04E+00	<1	4.55E+00	<1
Barium	5.86E+02	1.47E-01	0.00E+00	0.00E+00	1.25E-02	1.25E-02	4.58E-03	5.13E-01	5.30E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	0.00E+00	3.86E-01	3.86E-01	0.00E+00	2.28E-02	4.08E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.35E+01	0.00E+00	0.00E+00	0.00E+00	1.07E-01	1.07E-01	0.00E+00	1.18E-02	1.18E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	3.07E-01	3.07E-01	1.63E-03	4.20E-01	7.29E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	0.00E+00	2.47E-02	2.47E-02	0.00E+00	1.41E-03	2.61E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	0.00E+00	4.98E-03	4.98E-03	6.87E-05	1.13E-02	1.64E-02	4.16E+00	<1	9.44E+00	<1
Zinc	4.31E+01	0.00E+00	0.00E+00	0.00E+00	3.20E+00	3.20E+00	0.00E+00	3.77E-02	3.24E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-04	3.60E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-9
Refined Exposure Evaluation - Canada Lynx
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Canada Lynx Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-10
Refined Exposure Evaluation - Grizzly Bear
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Shallow Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals														
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.86E-02	0.00E+00	5.86E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	4.92E-03	3.79E-03	1.06E-04	0.00E+00	8.81E-03	0.00E+00	5.64E-03	1.45E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.86E+02	1.47E-01	1.28E+00	1.73E-01	8.64E-04	0.00E+00	1.46E+00	3.16E-03	3.55E-01	1.82E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	9.89E-02	4.35E-02	2.67E-02	0.00E+00	1.69E-01	0.00E+00	1.58E-02	1.85E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.35E+01	0.00E+00	1.60E-02	2.13E-02	7.36E-03	0.00E+00	4.46E-02	0.00E+00	8.16E-03	5.28E-02	4.70E+00	<1	1.86E+02	<1
Manganese	4.80E+02	5.21E-02	5.32E-01	9.72E-02	2.12E-02	0.00E+00	6.51E-01	1.12E-03	2.90E-01	9.42E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	1.21E-02	4.27E-03	1.71E-03	0.00E+00	1.81E-02	0.00E+00	9.78E-04	1.91E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	8.82E-04	1.76E-03	3.44E-04	0.00E+00	2.99E-03	4.75E-05	7.83E-03	1.09E-02	4.16E+00	<1	9.44E+00	<1
Zinc	4.31E+01	0.00E+00	5.46E-01	9.52E-01	2.21E-01	0.00E+00	1.72E+00	0.00E+00	2.61E-02	1.75E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics														
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-04	2.49E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)														
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)														
Low Molecular Weight (LMW) PAHs:														
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:														
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs							0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	<1	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs														
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-10
Refined Exposure Evaluation - Grizzly Bear
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Grizzly Bear Dose (mg/kg bw-day)											
			Diet					Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Plants	Invertebrates	Small Mammals	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}							
Volatile Organic Compounds (VOCs)														
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans														
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans							0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-11
Refined Exposure Evaluation - Long-tailed Weasel
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-01	0.00E+00	1.40E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-03	2.52E-03	0.00E+00	7.69E-03	1.02E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.86E+02	1.47E-01	0.00E+00	0.00E+00	2.06E-02	2.06E-02	7.54E-03	4.83E-01	5.11E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	0.00E+00	6.35E-01	6.35E-01	0.00E+00	2.15E-02	6.57E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.35E+01	0.00E+00	0.00E+00	0.00E+00	1.75E-01	1.75E-01	0.00E+00	1.11E-02	1.87E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	5.06E-01	5.06E-01	2.68E-03	3.95E-01	9.04E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-02	4.07E-02	0.00E+00	1.33E-03	4.20E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	0.00E+00	8.20E-03	8.20E-03	1.13E-04	1.07E-02	1.90E-02	4.16E+00	<1	9.44E+00	<1
Zinc	4.31E+01	0.00E+00	0.00E+00	0.00E+00	5.27E+00	5.27E+00	0.00E+00	3.55E-02	5.31E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-04	3.39E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-11
Refined Exposure Evaluation - Long-tailed Weasel
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Long-tailed Weasel Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-12
Refined Exposure Evaluation - Meadow Vole
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-01	0.00E+00	4.08E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	5.26E-02	0.00E+00	0.00E+00	5.26E-02	0.00E+00	1.82E-02	7.08E-02	1.04E+00	<1	4.55E+00	<1
Barium	5.86E+02	1.47E-01	1.37E+01	0.00E+00	0.00E+00	1.37E+01	2.20E-02	1.15E+00	1.49E+01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	1.06E+00	0.00E+00	0.00E+00	1.06E+00	0.00E+00	5.09E-02	1.11E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.35E+01	0.00E+00	1.71E-01	0.00E+00	0.00E+00	1.71E-01	0.00E+00	2.63E-02	1.98E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.80E+02	5.21E-02	5.70E+00	0.00E+00	0.00E+00	5.70E+00	7.82E-03	9.37E-01	6.64E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	1.30E-01	0.00E+00	0.00E+00	1.30E-01	0.00E+00	3.16E-03	1.33E-01	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	9.44E-03	0.00E+00	0.00E+00	9.44E-03	3.31E-04	2.53E-02	3.51E-02	4.16E+00	<1	9.44E+00	<1
Zinc	4.31E+01	0.00E+00	5.84E+00	0.00E+00	0.00E+00	5.84E+00	0.00E+00	8.42E-02	5.92E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.03E-04	8.03E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-12
Refined Exposure Evaluation - Meadow Vole
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Meadow Vole Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)

B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

DF_i = Dietary fraction of food item i (proportion of food type in the diet)

AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

BW = Body weight of the receptor, wet weight (kg)

ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-13
Refined Exposure Evaluation - Mink
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	1.17E-01	0.00E+00	1.17E-01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	5.86E+02	1.47E-01	0.00E+00	0.00E+00	0.00E+00	6.34E-03	0.00E+00	6.34E-03	5.18E+01	<1	8.27E+01	<1
Beryllium	7.63E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	0.00E+00	2.25E-03	0.00E+00	2.25E-03	5.15E+01	<1	1.46E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	0.00E+00	0.00E+00	9.51E-05	0.00E+00	9.51E-05	4.16E+00	<1	9.44E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.87E+01	--	6.87E+02	--
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	9.30E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	5.19E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total LMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	--	3.56E+02	--
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	4.94E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(A)Pyrene	6.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	6.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	9.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Dibenz(A,H)Anthracene	1.31E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	5.23E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Pyrene	8.06E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total HMW PAHs					0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-13
Refined Exposure Evaluation - Mink
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-14
Refined Exposure Evaluation - North American Wolverine
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.15E-02	0.00E+00	8.15E-02	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-03	1.47E-03	0.00E+00	7.85E-03	9.32E-03	1.04E+00	<1	4.55E+00	<1
Barium	5.86E+02	1.47E-01	0.00E+00	0.00E+00	1.20E-02	1.20E-02	4.40E-03	4.93E-01	5.10E-01	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	0.00E+00	3.71E-01	3.71E-01	0.00E+00	2.19E-02	3.93E-01	5.60E+00	<1	8.27E+01	<1
Lead	1.35E+01	0.00E+00	0.00E+00	0.00E+00	1.02E-01	1.02E-01	0.00E+00	1.13E-02	1.14E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.80E+02	5.21E-02	0.00E+00	0.00E+00	2.96E-01	2.96E-01	1.56E-03	4.04E-01	7.01E-01	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-02	2.38E-02	0.00E+00	1.36E-03	2.51E-02	1.43E-01	<1	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	0.00E+00	4.79E-03	4.79E-03	6.61E-05	1.09E-02	1.57E-02	4.16E+00	<1	9.44E+00	<1
Zinc	4.31E+01	0.00E+00	0.00E+00	0.00E+00	3.08E+00	3.08E+00	0.00E+00	3.63E-02	3.11E+00	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-04	3.46E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-14
Refined Exposure Evaluation - North American Wolverine
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		North American Wolverine Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H24-15
Refined Exposure Evaluation - Short-tailed Shrew
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals													
Aluminum	0.00E+00	2.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.64E-01	0.00E+00	3.64E-01	No TRV	--	No TRV	--
Antimony	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	9.33E+00	0.00E+00	0.00E+00	1.57E-01	0.00E+00	1.57E-01	0.00E+00	1.38E-02	1.70E-01	1.04E+00	<1	4.55E+00	<1
Barium	5.86E+02	1.47E-01	0.00E+00	7.15E+00	0.00E+00	7.15E+00	1.96E-02	8.64E-01	8.04E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	2.61E+01	0.00E+00	0.00E+00	1.80E+00	0.00E+00	1.80E+00	0.00E+00	3.84E-02	1.84E+00	5.60E+00	<1	8.27E+01	<1
Lead	1.35E+01	0.00E+00	0.00E+00	8.80E-01	0.00E+00	8.80E-01	0.00E+00	1.99E-02	9.00E-01	4.70E+00	<1	1.86E+02	<1
Manganese	4.80E+02	5.21E-02	0.00E+00	4.02E+00	0.00E+00	4.02E+00	6.98E-03	7.07E-01	4.74E+00	5.15E+01	<1	1.46E+02	<1
Mercury	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	1.62E+00	0.00E+00	0.00E+00	1.77E-01	0.00E+00	1.77E-01	0.00E+00	2.38E-03	1.79E-01	1.43E-01	1.25E+00	6.60E-01	<1
Silver	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.29E+01	2.20E-03	0.00E+00	7.29E-02	0.00E+00	7.29E-02	2.95E-04	1.91E-02	9.23E-02	4.16E+00	<1	9.44E+00	<1
Zinc	4.31E+01	0.00E+00	0.00E+00	3.94E+01	0.00E+00	3.94E+01	0.00E+00	6.36E-02	3.95E+01	7.54E+01	<1	2.98E+02	<1
Inorganics - Other Inorganics													
Cyanide	4.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-04	6.06E-04	6.87E+01	<1	6.87E+02	<1
Fluoride	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Acenaphthylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Fluorene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Naphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total LMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(A)Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(b)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(k)fluoranthene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Pyrene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total HMW PAHs						0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-01	--	3.84E+01	--
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.83E+01	--	1.83E+02	--
Butylbenzylphthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	8.42E+00	--	2.27E+01	--

Table H24-15
Refined Exposure Evaluation - Short-tailed Shrew
Northern Surface Water Feature
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Short-tailed Shrew Dose (mg/kg bw-day)										
			Diet				Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Maximum Surface Soil Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Plants	Invertebrates	Small Mammals	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)													
Methylcyclohexane	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans													
2,3,7,8-TCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	--	--	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans						0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD_{diet} = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR_{diet} = Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF_i = Dietary fraction of food item i (proportion of food type in the diet)
AUF = Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW = Body weight of the receptor, wet weight (kg)
ADD_{substrate} = Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR_s = Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C_{substrate} = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H25-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Metals												
Aluminum	NA	4.86E-01	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)	---	9.24E+02	4.49E+02	Sample et al. (1996)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)	---	4.00E+00	0.00E+00	Sample et al. (1996)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	6.80E+01	0.00E+00	Sample et al. (1996)
Barium	NA	1.17E-01	1.00E+02	NA	2.82E+00	---	2.83E+02	Hamilton et al. (2002)	---	2.98E+02	3.48E+01	Nakamoto and Hassler (1992)
Beryllium	NA	0.00E+00	4.16E-01	NA	1.67E-01	---	6.95E-02	Hamilton et al. (2002)	---	7.60E+01	0.00E+00	Sample et al. (1996)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.96E+04	0.00E+00	Sample et al. (1996)
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.20E+01	0.00E+00	Sample et al. (1996)
Cobalt		0.00E+00	0.00E+00									
Copper	NA	0.00E+00	0.00E+00	NA	6.61E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.16E+03	0.00E+00	Sample et al. (1996)
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.80E+02	0.00E+00	Sample et al. (1996)
Manganese		2.84E-02	0.00E+00									
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c	---	1.92E+02	0.00E+00	DTSC (2000)
Nickel	NA	0.00E+00	0.00E+00	NA	1.34E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.24E+02	0.00E+00	Sample et al. (1996)
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)	---	1.04E+04	0.00E+00	Sample et al. (1996)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)	---	4.24E+02	0.00E+00	Laplace et al. (1992)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)	---	1.36E+02	0.00E+00	Sample et al. (1996)
Vanadium	NA	1.24E-03	1.56E+01	NA	2.50E-01	---	3.90E+00	Hamilton and Buhl (2002)	---	2.52E+03	3.11E+00	CECBP (2008)
Zinc	NA	0.00E+00	0.00E+00	NA	8.40E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	3.86E+03	0.00E+00	Sample et al. (1996)
Inorganics - Other Inorganics												
Cyanide	NA	8.50E-02	1.69E+00	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aquirre-Sierra et al. (2013)	---	Regression	0.00E+00	Derived based on Shi et al. (2009)
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	4.01	0.00E+00	5.40E-03	7.04E-01	4.58E+00	---	2.47E-02	DiToro and McGrath (2000)	5.63E+00	---	3.04E-02	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)	6.04E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	3.65E-02	6.73E-01	4.37E+00	---	1.60E-01	DiToro and McGrath (2000)	5.38E+00	---	1.96E-01	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	1.38E+00	6.41E-01	4.17E+00	---	5.76E+00	DiToro and McGrath (2000)	5.13E+00	---	7.09E+00	DiToro and McGrath (2000)

Table H25-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	0.00E+00	6.92E-01	4.50E+00	---	0.00E+00	DiToro and McGrath (2000)	5.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)	5.96E+00	---	0.00E+00	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	2.39E-01	6.70E-01	4.36E+00	---	1.04E+00	DiToro and McGrath (2000)	5.36E+00	---	1.28E+00	DiToro and McGrath (2000)
Total LMW PAHs							6.99E+00				8.60E+00	
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	6.71	0.00E+00	4.56E-01	5.56E-01	3.61E+00	---	1.65E+00	DiToro and McGrath (2000)	4.45E+00	---	2.03E+00	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	1.94E-01	5.86E-01	3.81E+00	---	7.41E-01	DiToro and McGrath (2000)	4.69E+00	---	9.12E-01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)	4.62E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	2.59E-01	5.66E-01	3.68E+00	---	9.52E-01	DiToro and McGrath (2000)	4.53E+00	---	1.17E+00	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	4.19E-01	5.77E-01	3.75E+00	---	1.57E+00	DiToro and McGrath (2000)	4.61E+00	---	1.93E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	1.21E+00	6.07E-01	3.94E+00	---	4.76E+00	DiToro and McGrath (2000)	4.85E+00	---	5.86E+00	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	8.80E-02	5.56E-01	3.61E+00	---	3.18E-01	DiToro and McGrath (2000)	4.45E+00	---	3.91E-01	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	3.03E-01	5.55E-01	3.61E+00	---	1.10E+00	DiToro and McGrath (2000)	4.44E+00	---	1.35E+00	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.36E+00	6.50E-01	4.23E+00	---	5.77E+00	DiToro and McGrath (2000)	5.20E+00	---	7.10E+00	DiToro and McGrath (2000)
Total HMW PAHs							1.69E+01				2.07E+01	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00									
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)	5.59E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)	5.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)	5.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	7.71E-03	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)	3.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00									
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)	5.78E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)	5.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)	3.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)	4.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00									
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane		0.00E+00	0.00E+00									

Table H25-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans												
2,3,7,8-TCDD		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00									
OCDD		0.00E+00	0.00E+00									
2,3,7,8-TCDF		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00									
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00									
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00									
OCDF		0.00E+00	0.00E+00									

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H25-2
Refined Exposure Evaluation - American Dipper
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	4.86E-01	0.00E+00	0.00E+00	0.00E+00	8.07E-02	0.00E+00	8.07E-02	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	1.00E+02	1.17E-01	4.69E+01	0.00E+00	4.69E+01	1.94E-02	3.33E-01	4.72E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	4.16E-01	0.00E+00	1.15E-02	0.00E+00	1.15E-02	0.00E+00	1.38E-03	1.29E-02	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	0.00E+00	2.84E-02	0.00E+00	0.00E+00	0.00E+00	4.72E-03	0.00E+00	4.72E-03	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.56E+01	1.24E-03	6.47E-01	0.00E+00	6.47E-01	2.05E-04	5.17E-02	6.99E-01	3.44E-01	2.03E+00	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	1.69E+00	8.50E-02	0.00E+00	0.00E+00	0.00E+00	1.41E-02	5.60E-03	1.97E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	5.40E-03	0.00E+00	4.10E-03	0.00E+00	4.10E-03	0.00E+00	1.79E-05	4.12E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	3.65E-02	0.00E+00	2.65E-02	0.00E+00	2.65E-02	0.00E+00	1.21E-04	2.66E-02				
Fluoranthene	1.38E+00	0.00E+00	9.56E-01	0.00E+00	9.56E-01	0.00E+00	4.59E-03	9.61E-01				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.39E-01	0.00E+00	1.73E-01	0.00E+00	1.73E-01	0.00E+00	7.94E-04	1.74E-01				
Total LMW PAHs					1.16E+00	0.00E+00	5.52E-03	1.17E+00	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	4.56E-01	0.00E+00	2.73E-01	0.00E+00	2.73E-01	0.00E+00	1.51E-03	2.75E-01				
Benzo(A)Pyrene	1.94E-01	0.00E+00	1.23E-01	0.00E+00	1.23E-01	0.00E+00	6.45E-04	1.24E-01				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	2.59E-01	0.00E+00	1.58E-01	0.00E+00	1.58E-01	0.00E+00	8.59E-04	1.59E-01				
Benzo(k)fluoranthene	4.19E-01	0.00E+00	2.60E-01	0.00E+00	2.60E-01	0.00E+00	1.39E-03	2.62E-01				
Chrysene	1.21E+00	0.00E+00	7.90E-01	0.00E+00	7.90E-01	0.00E+00	4.01E-03	7.94E-01				
Dibenz(A,H)Anthracene	8.80E-02	0.00E+00	5.28E-02	0.00E+00	5.28E-02	0.00E+00	2.92E-04	5.31E-02				
Indeno (1,2,3-CD) Pyrene	3.03E-01	0.00E+00	1.82E-01	0.00E+00	1.82E-01	0.00E+00	1.01E-03	1.83E-01				
Pyrene	1.36E+00	0.00E+00	9.57E-01	0.00E+00	9.57E-01	0.00E+00	4.53E-03	9.61E-01				
Total HMW PAHs					2.80E+00	0.00E+00	1.42E-02	2.81E+00	2.00E+00	1.41E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	7.71E-03	0.00E+00	0.00E+00	0.00E+00	1.28E-03	0.00E+00	1.28E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H25-2
Refined Exposure Evaluation - American Dipper
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H25-3
Refined Exposure Evaluation - Belted Kingfisher
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	4.86E-01	0.00E+00	6.37E+01	6.37E+01	7.66E-02	0.00E+00	6.38E+01	1.10E+02	<1	1.10E+03	<1
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	1.00E+02	1.17E-01	4.45E+00	4.93E+00	9.38E+00	1.84E-02	0.00E+00	9.40E+00	7.35E+01	<1	1.31E+02	<1
Beryllium	4.16E-01	0.00E+00	1.10E-03	0.00E+00	1.10E-03	0.00E+00	0.00E+00	1.10E-03	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	0.00E+00	2.84E-02	0.00E+00	0.00E+00	0.00E+00	4.48E-03	0.00E+00	4.48E-03	1.79E+02	<1	3.77E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	1.56E+01	1.24E-03	6.14E-02	4.42E-01	5.03E-01	1.95E-04	0.00E+00	5.03E-01	3.44E-01	1.46E+00	1.70E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	1.69E+00	8.50E-02	0.00E+00	0.00E+00	0.00E+00	1.34E-02	0.00E+00	1.34E-02	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	5.40E-03	0.00E+00	3.90E-04	4.32E-03	4.71E-03	0.00E+00	0.00E+00	4.71E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	3.65E-02	0.00E+00	2.52E-03	2.79E-02	3.04E-02	0.00E+00	0.00E+00	3.04E-02				
Fluoranthene	1.38E+00	0.00E+00	9.08E-02	1.01E+00	1.10E+00	0.00E+00	0.00E+00	1.10E+00				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.39E-01	0.00E+00	1.64E-02	1.82E-01	1.98E-01	0.00E+00	0.00E+00	1.98E-01				
Total LMW PAHs					1.33E+00	0.00E+00	0.00E+00	1.33E+00	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	4.56E-01	0.00E+00	2.59E-02	2.87E-01	3.13E-01	0.00E+00	0.00E+00	3.13E-01				
Benzo(A)Pyrene	1.94E-01	0.00E+00	1.17E-02	1.29E-01	1.41E-01	0.00E+00	0.00E+00	1.41E-01				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	2.59E-01	0.00E+00	1.50E-02	1.66E-01	1.81E-01	0.00E+00	0.00E+00	1.81E-01				
Benzo(k)fluoranthene	4.19E-01	0.00E+00	2.47E-02	2.74E-01	2.99E-01	0.00E+00	0.00E+00	2.99E-01				
Chrysene	1.21E+00	0.00E+00	7.50E-02	8.31E-01	9.06E-01	0.00E+00	0.00E+00	9.06E-01				
Dibenz(A,H)Anthracene	8.80E-02	0.00E+00	5.01E-03	5.55E-02	6.05E-02	0.00E+00	0.00E+00	6.05E-02				
Indeno (1,2,3-CD) Pyrene	3.03E-01	0.00E+00	1.73E-02	1.91E-01	2.08E-01	0.00E+00	0.00E+00	2.08E-01				
Pyrene	1.36E+00	0.00E+00	9.09E-02	1.01E+00	1.10E+00	0.00E+00	0.00E+00	1.10E+00				
Total HMW PAHs					3.21E+00	0.00E+00	0.00E+00	3.21E+00	2.00E+00	1.60E+00	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	7.71E-03	0.00E+00	0.00E+00	0.00E+00	1.22E-03	0.00E+00	1.22E-03	1.10E+00	<1	1.10E+01	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H25-3
Refined Exposure Evaluation - Belted Kingfisher
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H25-4
Refined Exposure Evaluation - Mink
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	4.86E-01	0.00E+00	1.94E+01	1.94E+01	2.10E-02	0.00E+00	1.94E+01	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	1.00E+02	1.17E-01	0.00E+00	1.50E+00	1.50E+00	5.05E-03	0.00E+00	1.51E+00	5.18E+01	<1	8.27E+01	<1
Beryllium	4.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	0.00E+00	2.84E-02	0.00E+00	0.00E+00	0.00E+00	1.23E-03	0.00E+00	1.23E-03	5.15E+01	<1	1.46E+02	<1
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	1.56E+01	1.24E-03	0.00E+00	1.35E-01	1.35E-01	5.34E-05	0.00E+00	1.35E-01	4.16E+00	<1	9.44E+00	<1
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics												
Cyanide	1.69E+00	8.50E-02	0.00E+00	0.00E+00	0.00E+00	3.68E-03	0.00E+00	3.68E-03	6.87E+01	<1	6.87E+02	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	5.40E-03	0.00E+00	0.00E+00	1.32E-03	1.32E-03	0.00E+00	0.00E+00	1.32E-03				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	3.65E-02	0.00E+00	0.00E+00	8.49E-03	8.49E-03	0.00E+00	0.00E+00	8.49E-03				
Fluoranthene	1.38E+00	0.00E+00	0.00E+00	3.07E-01	3.07E-01	0.00E+00	0.00E+00	3.07E-01				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	2.39E-01	0.00E+00	0.00E+00	5.55E-02	5.55E-02	0.00E+00	0.00E+00	5.55E-02				
Total LMW PAHs					3.72E-01	0.00E+00	0.00E+00	3.72E-01	6.56E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	4.56E-01	0.00E+00	0.00E+00	8.76E-02	8.76E-02	0.00E+00	0.00E+00	8.76E-02				
Benzo(A)Pyrene	1.94E-01	0.00E+00	0.00E+00	3.94E-02	3.94E-02	0.00E+00	0.00E+00	3.94E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	2.59E-01	0.00E+00	0.00E+00	5.07E-02	5.07E-02	0.00E+00	0.00E+00	5.07E-02				
Benzo(k)fluoranthene	4.19E-01	0.00E+00	0.00E+00	8.35E-02	8.35E-02	0.00E+00	0.00E+00	8.35E-02				
Chrysene	1.21E+00	0.00E+00	0.00E+00	2.53E-01	2.53E-01	0.00E+00	0.00E+00	2.53E-01				
Dibenz(A,H)Anthracene	8.80E-02	0.00E+00	0.00E+00	1.69E-02	1.69E-02	0.00E+00	0.00E+00	1.69E-02				
Indeno (1,2,3-CD) Pyrene	3.03E-01	0.00E+00	0.00E+00	5.83E-02	5.83E-02	0.00E+00	0.00E+00	5.83E-02				
Pyrene	1.36E+00	0.00E+00	0.00E+00	3.07E-01	3.07E-01	0.00E+00	0.00E+00	3.07E-01				
Total HMW PAHs					8.97E-01	0.00E+00	0.00E+00	8.97E-01	6.15E-01	1.46E+00	3.84E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	7.71E-03	0.00E+00	0.00E+00	0.00E+00	3.34E-04	0.00E+00	3.34E-04	1.83E+01	<1	1.83E+02	<1
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--

Table H25-4
Refined Exposure Evaluation - Mink
Flathead River
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H26-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Metals												
Aluminum	NA	0.00E+00	0.00E+00	NA	7.40E-02	---	0.00E+00	Stanley et al. (2010)	---	9.24E+02	0.00E+00	Sample et al. (1996)
Antimony	NA	0.00E+00	0.00E+00	NA	5.75E-01	---	0.00E+00	Dovick et al. (2015)	---	4.00E+00	0.00E+00	Sample et al. (1996)
Arsenic	NA	0.00E+00	0.00E+00	NA	3.73E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	6.80E+01	0.00E+00	Sample et al. (1996)
Barium	NA	1.08E-01	1.65E+02	NA	2.82E+00	---	4.65E+02	Hamilton et al. (2002)	---	2.98E+02	3.22E+01	Nakamoto and Hassler (1992)
Beryllium	NA	0.00E+00	0.00E+00	NA	1.67E-01	---	0.00E+00	Hamilton et al. (2002)	---	7.60E+01	0.00E+00	Sample et al. (1996)
Cadmium	NA	0.00E+00	0.00E+00	NA	4.59E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.96E+04	0.00E+00	Sample et al. (1996)
Chromium	NA	0.00E+00	0.00E+00	NA	8.30E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.20E+01	0.00E+00	Sample et al. (1996)
Cobalt		0.00E+00	0.00E+00									
Copper	NA	0.00E+00	0.00E+00	NA	6.61E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.16E+03	0.00E+00	Sample et al. (1996)
Lead	NA	0.00E+00	0.00E+00	NA	8.00E-02	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	1.80E+02	0.00E+00	Sample et al. (1996)
Manganese		0.00E+00	3.49E+02									
Mercury	NA	0.00E+00	0.00E+00	NA	2.84E+00	---	0.00E+00	Bechtel-Jacobs (1998c) ^c	---	1.92E+02	0.00E+00	DTSC (2000)
Nickel	NA	0.00E+00	0.00E+00	NA	1.34E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	4.24E+02	0.00E+00	Sample et al. (1996)
Selenium	NA	0.00E+00	0.00E+00	NA	3.75E+00	---	0.00E+00	Hamilton et al. (2002)	---	1.04E+04	0.00E+00	Sample et al. (1996)
Silver	NA	0.00E+00	0.00E+00	NA	1.80E-01	---	0.00E+00	Hirsch (1998)	---	4.24E+02	0.00E+00	Laplace et al. (1992)
Thallium	NA	0.00E+00	0.00E+00	NA	2.00E-02	---	0.00E+00	Turner et al. (2013)	---	1.36E+02	0.00E+00	Sample et al. (1996)
Vanadium	NA	0.00E+00	0.00E+00	NA	2.50E-01	---	0.00E+00	Hamilton and Buhl (2002)	---	2.52E+03	0.00E+00	CECBP (2008)
Zinc	NA	0.00E+00	0.00E+00	NA	8.40E-01	---	0.00E+00	Bechtel-Jacobs (1998b) ^c	---	3.86E+03	0.00E+00	Sample et al. (1996)
Inorganics - Other Inorganics												
Cyanide	NA	5.01E-03	1.60E-01	NA	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)	0.00E+00	0.00E+00	0.00E+00	Lanno and Menzie (2005)
Fluoride	NA	0.00E+00	0.00E+00	NA	---	Regression	0.00E+00	Derived based on Aguirre-Sierra et al. (2013)	---	Regression	0.00E+00	Derived based on Shi et al. (2009)
Polychlorinated Biphenyls (PCBs)		0.00E+00										
Aroclor 1248	6.34	0.00E+00	0.00E+00	5.74E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Aroclor 1254	6.98	0.00E+00	0.00E+00	5.43E-01	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)	0.00E+00	---	0.00E+00	DiToro and McGrath (2000)
Semi-volatile Organic Compounds (SVOCs) - Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	4.01	0.00E+00	0.00E+00	7.04E-01	4.58E+00	---	0.00E+00	DiToro and McGrath (2000)	5.63E+00	---	0.00E+00	DiToro and McGrath (2000)
Acenaphthylene	3.22	0.00E+00	0.00E+00	7.54E-01	4.90E+00	---	0.00E+00	DiToro and McGrath (2000)	6.04E+00	---	0.00E+00	DiToro and McGrath (2000)
Anthracene	4.53	0.00E+00	0.00E+00	6.73E-01	4.37E+00	---	0.00E+00	DiToro and McGrath (2000)	5.38E+00	---	0.00E+00	DiToro and McGrath (2000)
Fluoranthene	5.08	0.00E+00	1.29E-01	6.41E-01	4.17E+00	---	5.37E-01	DiToro and McGrath (2000)	5.13E+00	---	6.61E-01	DiToro and McGrath (2000)

Table H26-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Fluorene	4.21	0.00E+00	0.00E+00	6.92E-01	4.50E+00	---	0.00E+00	DiToro and McGrath (2000)	5.53E+00	---	0.00E+00	DiToro and McGrath (2000)
Naphthalene	3.36	0.00E+00	0.00E+00	7.45E-01	4.84E+00	---	0.00E+00	DiToro and McGrath (2000)	5.96E+00	---	0.00E+00	DiToro and McGrath (2000)
Phenanthrene	4.57	0.00E+00	1.40E-01	6.70E-01	4.36E+00	---	6.12E-01	DiToro and McGrath (2000)	5.36E+00	---	7.53E-01	DiToro and McGrath (2000)
Total LMW PAHs							1.15E+00				1.41E+00	
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	6.71	0.00E+00	7.29E-02	5.56E-01	3.61E+00	---	2.63E-01	DiToro and McGrath (2000)	4.45E+00	---	3.24E-01	DiToro and McGrath (2000)
Benzo[A]Pyrene	6.11	0.00E+00	6.15E-02	5.86E-01	3.81E+00	---	2.34E-01	DiToro and McGrath (2000)	4.69E+00	---	2.88E-01	DiToro and McGrath (2000)
Benzo(b)fluoranthene	6.27	0.00E+00	0.00E+00	5.78E-01	3.76E+00	---	0.00E+00	DiToro and McGrath (2000)	4.62E+00	---	0.00E+00	DiToro and McGrath (2000)
Benzo(g,h,i)perylene	6.51	0.00E+00	5.22E-02	5.66E-01	3.68E+00	---	1.92E-01	DiToro and McGrath (2000)	4.53E+00	---	2.36E-01	DiToro and McGrath (2000)
Benzo(k)fluoranthene	6.29	0.00E+00	0.00E+00	5.77E-01	3.75E+00	---	0.00E+00	DiToro and McGrath (2000)	4.61E+00	---	0.00E+00	DiToro and McGrath (2000)
Chrysene	5.71	0.00E+00	8.71E-02	6.07E-01	3.94E+00	---	3.43E-01	DiToro and McGrath (2000)	4.85E+00	---	4.23E-01	DiToro and McGrath (2000)
Dibenz(A,H)Anthracene	6.71	0.00E+00	0.00E+00	5.56E-01	3.61E+00	---	0.00E+00	DiToro and McGrath (2000)	4.45E+00	---	0.00E+00	DiToro and McGrath (2000)
Indeno (1,2,3-CD) Pyrene	6.72	0.00E+00	4.86E-02	5.55E-01	3.61E+00	---	1.76E-01	DiToro and McGrath (2000)	4.44E+00	---	2.16E-01	DiToro and McGrath (2000)
Pyrene	4.92	0.00E+00	1.10E-01	6.50E-01	4.23E+00	---	4.66E-01	DiToro and McGrath (2000)	5.20E+00	---	5.73E-01	DiToro and McGrath (2000)
Total HMW PAHs							1.67E+00				2.06E+00	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene		0.00E+00	0.00E+00									
2,3,4,6-Tetrachlorophenol	4.09	0.00E+00	0.00E+00	6.99E-01	4.54E+00	---	0.00E+00	DiToro and McGrath (2000)	5.59E+00	---	0.00E+00	DiToro and McGrath (2000)
2-Chloronaphthalene	3.81	0.00E+00	0.00E+00	7.16E-01	4.66E+00	---	0.00E+00	DiToro and McGrath (2000)	5.73E+00	---	0.00E+00	DiToro and McGrath (2000)
Biphenyl (Diphenyl)	3.76	0.00E+00	0.00E+00	7.20E-01	4.68E+00	---	0.00E+00	DiToro and McGrath (2000)	5.76E+00	---	0.00E+00	DiToro and McGrath (2000)
Bis(2-ethylhexyl)phthalate	8.39	0.00E+00	0.00E+00	4.80E-01	3.12E+00	---	0.00E+00	DiToro and McGrath (2000)	3.84E+00	---	0.00E+00	DiToro and McGrath (2000)
Butylbenzylphthalate		0.00E+00	0.00E+00									
Dibenzofuran	3.71	0.00E+00	0.00E+00	7.23E-01	4.70E+00	---	0.00E+00	DiToro and McGrath (2000)	5.78E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-butyl phthalate	4.61	0.00E+00	0.00E+00	6.68E-01	4.34E+00	---	0.00E+00	DiToro and McGrath (2000)	5.34E+00	---	0.00E+00	DiToro and McGrath (2000)
Di-n-octyl phthalate	8.54	0.00E+00	0.00E+00	4.74E-01	3.08E+00	---	0.00E+00	DiToro and McGrath (2000)	3.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobenzene	5.86	0.00E+00	0.00E+00	5.99E-01	3.89E+00	---	0.00E+00	DiToro and McGrath (2000)	4.79E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachlorobutadiene	4.72	0.00E+00	0.00E+00	6.62E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Hexachloroethane		0.00E+00	0.00E+00									
Pentachlorophenol	4.74	0.00E+00	0.00E+00	6.61E-01	4.30E+00	---	0.00E+00	DiToro and McGrath (2000)	5.29E+00	---	0.00E+00	DiToro and McGrath (2000)
Volatile Organic Compounds (VOCs)												
Methylcyclohexane		0.00E+00	0.00E+00									

Table H26-1
Estimated Aquatic Prey Concentrations - Screening-Level Exposure Evaluation - Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	log K _{ow}	Refined Surface Water Concentration (mg/L)	Refined Sediment Concentration (mg/kg, dry weight)	Normalized BSAF (kg OC/kg lipid) ^a	Estimated Concentrations in Dietary Items of Aquatic Receptors (mg/kg, dry weight)							
					Aquatic Life Stage Benthic Invertebrates				Fish			
					BSAF ^b	BCF	Estimated Concentration	BSAF/BCF Reference	BSAF	BCF	Estimated Concentration	BSAF/BCF Reference
Dioxin/Furans												
2,3,7,8-TCDD		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDD		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDD		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDD		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDD		0.00E+00	0.00E+00									
OCDD		0.00E+00	0.00E+00									
2,3,7,8-TCDF		0.00E+00	0.00E+00									
1,2,3,7,8-PeCDF		0.00E+00	0.00E+00									
2,3,4,7,8-PeCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,6,7,8-HxCDF		0.00E+00	0.00E+00									
2,3,4,6,7,8-HxCDF		0.00E+00	0.00E+00									
1,2,3,7,8,9-HxCDF		0.00E+00	0.00E+00									
1,2,3,4,6,7,8-HpCDF		0.00E+00	0.00E+00									
1,2,3,4,7,8,9-HpCDF		0.00E+00	0.00E+00									
OCDF		0.00E+00	0.00E+00									

Notes:

NA, Normalized BSAF was not applicable for metals

a, Normalized BSAF (kg OC / kg lipid) calculated based on K_{ow}, where BSAF = K_{ow}^{-0.038} (DiToro and McGrath 2000)

b, For non-ionic organic constituents, dry weight BSAF calculated from sediment organic carbon and lipid normalized BSAF as follows:

$$BSAF_{dry\ weight} = BSAF_{norm} \times f_{lipid} \times \frac{1}{f_{oc}}$$

where: BSAF_{norm} = Normalized BSAF (kg OC/kg lipid)

f_{lipid} = Fraction of lipids in prey item expressed on a dry weight basis (0.065, invertebrates; 0.08, fish)

f_{oc} = Fraction of sediment organic carbon expressed on a dry weight basis (0.01 or 1%)

c, Median BSAF for non-depurated invertebrates determined by Bechtel-Jacobs (1998b)

Table H26-2
Refined Exposure Evaluation - American Dipper
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.10E+02	--	1.10E+03	--
Antimony	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Arsenic	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	1.65E+02	1.08E-01	7.72E+01	0.00E+00	7.72E+01	1.80E-02	5.48E-01	7.78E+01	7.35E+01	1.06E+00	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	3.49E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	1.16E+00	1.79E+02	<1	3.77E+02	<1
Mercury	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-01	--	1.70E+00	--
Zinc	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	1.60E-01	5.01E-03	0.00E+00	0.00E+00	0.00E+00	8.31E-04	5.30E-04	1.36E-03	4.00E-02	<1	4.00E-01	<1
Fluoride	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	1.29E-01	0.00E+00	8.91E-02	0.00E+00	8.91E-02	0.00E+00	4.27E-04	8.95E-02				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Phenanthrene	1.40E-01	0.00E+00	1.02E-01	0.00E+00	1.02E-01	0.00E+00	4.66E-04	1.02E-01				
Total LMW PAHs					1.91E-01	0.00E+00	8.93E-04	1.91E-01	1.61E+01	<1	1.61E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.29E-02	0.00E+00	4.37E-02	0.00E+00	4.37E-02	0.00E+00	2.42E-04	4.39E-02				
Benzo(A)Pyrene	6.15E-02	0.00E+00	3.89E-02	0.00E+00	3.89E-02	0.00E+00	2.04E-04	3.91E-02				
Benzo(b)fluoranthene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Benzo(g,h,i)perylene	5.22E-02	0.00E+00	3.19E-02	0.00E+00	3.19E-02	0.00E+00	1.73E-04	3.20E-02				
Benzo(k)fluoranthene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Chrysene	8.71E-02	0.00E+00	5.70E-02	0.00E+00	5.70E-02	0.00E+00	2.89E-04	5.73E-02				
Dibenz(A,H)Anthracene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Indeno (1,2,3-CD) Pyrene	4.86E-02	0.00E+00	2.91E-02	0.00E+00	2.91E-02	0.00E+00	1.61E-04	2.93E-02				
Pyrene	1.10E-01	0.00E+00	7.72E-02	0.00E+00	7.72E-02	0.00E+00	3.66E-04	7.76E-02				
Total HMW PAHs					2.78E-01	0.00E+00	1.44E-03	2.79E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	6.73E+00	--	5.20E+01	--

Table H26-2
Refined Exposure Evaluation - American Dipper
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		American Dipper Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDD	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,7,8-TCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8-PeCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,7,8-PeCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8-HxCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,6,7,8-HxCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
2,3,4,6,7,8-HxCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,7,8,9-HxCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,6,7,8-HpCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
1,2,3,4,7,8,9-HpCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
OCDF	ND	0.00E+00	--	0.00E+00	0.00E+00	0.00E+00	--	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

ADD _{diet}	= Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
IR _{diet}	= Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF	= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)
DF _i	= Dietary fraction of food item i (proportion of food type in the diet)
AUF	= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate
BW	= Body weight of the receptor, wet weight (kg)
ADD _{substrate}	= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)
IR _s	= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)
C _{substrate}	= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H26-3
Refined Exposure Evaluation - Belted Kingfisher
Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Inorganics - Metals												
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+02	--	1.10E+03	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+00	--	4.51E+00	--
Barium	1.65E+02	1.08E-01	7.33E+00	4.57E+00	1.19E+01	1.71E-02	0.00E+00	1.19E+01	7.35E+01	<1	1.31E+02	<1
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+00	--	6.35E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	--	1.56E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E+00	--	2.02E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.05E+00	--	3.48E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+00	--	4.46E+01	--
Manganese	3.49E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E+02	--	3.77E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.50E-01	--	9.10E-01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E+00	--	1.86E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-01	--	8.20E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E+00	--	6.05E+01	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-01	--	3.50E+00	--
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-01	--	1.70E+00	--
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.61E+01	--	1.71E+02	--
Inorganics - Other Inorganics												
Cyanide	1.60E-01	5.01E-03	0.00E+00	0.00E+00	0.00E+00	7.89E-04	0.00E+00	7.89E-04	4.00E-02	<1	4.00E-01	<1
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E+01	--	1.22E+02	--
Polychlorinated Biphenyls (PCBs)												
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-01	--	1.80E+00	--
Polycyclic Aromatic Hydrocarbons (PAHs)												
Low Molecular Weight (LMW) PAHs:												
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Fluoranthene	1.29E-01	0.00E+00	8.46E-03	9.37E-02	1.02E-01	0.00E+00	0.00E+00	1.02E-01				
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Phenanthrene	1.40E-01	0.00E+00	9.64E-03	1.07E-01	1.16E-01	0.00E+00	0.00E+00	1.16E-01				
Total LMW PAHs					2.19E-01	0.00E+00	0.00E+00	2.19E-01	1.61E+01	<1	3.56E+02	<1
High Molecular Weight (HMW) PAHs:												
Benzo(a)anthracene	7.29E-02	0.00E+00	4.15E-03	4.60E-02	5.01E-02	0.00E+00	0.00E+00	5.01E-02				
Benzo(A)Pyrene	6.15E-02	0.00E+00	3.69E-03	4.09E-02	4.46E-02	0.00E+00	0.00E+00	4.46E-02				
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Benzo(g,h,i)perylene	5.22E-02	0.00E+00	3.03E-03	3.35E-02	3.66E-02	0.00E+00	0.00E+00	3.66E-02				
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Chrysene	8.71E-02	0.00E+00	5.41E-03	5.99E-02	6.54E-02	0.00E+00	0.00E+00	6.54E-02				
Dibenz(A,H)Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Indeno (1,2,3-CD) Pyrene	4.86E-02	0.00E+00	2.77E-03	3.06E-02	3.34E-02	0.00E+00	0.00E+00	3.34E-02				
Pyrene	1.10E-01	0.00E+00	7.34E-03	8.13E-02	8.86E-02	0.00E+00	0.00E+00	8.86E-02				
Total HMW PAHs					3.19E-01	0.00E+00	0.00E+00	3.19E-01	2.00E+00	<1	2.00E+01	<1
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs												
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E+00	--	1.10E+01	--
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-01	--	1.10E+00	--
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E+00	--	5.00E+01	--
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E+00	--	5.20E+01	--

Table H26-3
Refined Exposure Evaluation - Belted Kingfisher
Cedar Creek
Baseline Ecological Screening Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Belted Kingfisher Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	--	1.75E-05	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

Table H26-4
Refined Exposure Evaluation - Mink
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)										
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}	
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}						
Inorganics - Metals													
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-02	--	2.76E+00	--
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E+00	--	4.55E+00	--
Barium	1.65E+02	1.08E-01	0.00E+00	1.39E+00	1.39E+00	4.68E-03	0.00E+00	1.40E+00	5.18E+01	<1	8.27E+01	<1	
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-01	--	6.70E-01	--
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.70E-01	--	6.87E+00	--
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E+00	--	5.82E+01	--
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E+00	--	1.89E+01	--
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E+00	--	8.27E+01	--
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E+00	--	1.86E+02	--
Manganese	3.49E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E+01	--	1.46E+02	--
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E+00	--	1.41E+01	--
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.70E+00	--	1.48E+01	--
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	--	6.60E-01	--
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.02E+00	--	1.19E+02	--
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-01	--	1.43E+00	--
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E+00	--	9.44E+00	--
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.54E+01	--	2.98E+02	--
Inorganics - Other Inorganics													
Cyanide	1.60E-01	5.01E-03	0.00E+00	0.00E+00	0.00E+00	2.17E-04	0.00E+00	2.17E-04	6.87E+01	<1	6.87E+02	<1	
Fluoride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+01	--	4.90E+01	--	
Polychlorinated Biphenyls (PCBs)													
Aroclor 1248	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--	
Aroclor 1254	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.80E-02	--	6.80E-01	--	
Polycyclic Aromatic Hydrocarbons (PAHs)													
Low Molecular Weight (LMW) PAHs:													
Acenaphthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Acenaphthylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Fluoranthene	1.29E-01	0.00E+00	0.00E+00	2.86E-02	2.86E-02	0.00E+00	0.00E+00	2.86E-02					
Fluorene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Phenanthrene	1.40E-01	0.00E+00	0.00E+00	3.26E-02	3.26E-02	0.00E+00	0.00E+00	3.26E-02					
Total LMW PAHs					6.11E-02	0.00E+00	0.00E+00	6.11E-02	6.56E+01	<1	3.56E+02	<1	
High Molecular Weight (HMW) PAHs:													
Benzo(a)anthracene	7.29E-02	0.00E+00	0.00E+00	1.40E-02	1.40E-02	0.00E+00	0.00E+00	1.40E-02					
Benzo(A)Pyrene	6.15E-02	0.00E+00	0.00E+00	1.25E-02	1.25E-02	0.00E+00	0.00E+00	1.25E-02					
Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Benzo(g,h,i)perylene	5.22E-02	0.00E+00	0.00E+00	1.02E-02	1.02E-02	0.00E+00	0.00E+00	1.02E-02					
Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Chrysene	8.71E-02	0.00E+00	0.00E+00	1.83E-02	1.83E-02	0.00E+00	0.00E+00	1.83E-02					
Dibenz(A,H)Anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00					
Indeno (1,2,3-CD) Pyrene	4.86E-02	0.00E+00	0.00E+00	9.34E-03	9.34E-03	0.00E+00	0.00E+00	9.34E-03					
Pyrene	1.10E-01	0.00E+00	0.00E+00	2.48E-02	2.48E-02	0.00E+00	0.00E+00	2.48E-02					
Total HMW PAHs					8.91E-02	0.00E+00	0.00E+00	8.91E-02	6.15E-01	<1	3.84E+01	<1	
Semi-volatile Organic Compounds (SVOCs) - Non-PAH SVOCs													
1,2,4,5-Tetrachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--	
2,3,4,6-Tetrachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--	
2-Chloronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--	
Biphenyl (Diphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--	
Bis(2-ethylhexyl)phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E+01	--	1.83E+02	--	
Butylbenzylphthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E+02	--	1.59E+03	--	
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--	
Di-n-butyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E+02	--	1.83E+03	--	
Di-n-octyl phthalate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.51E+01	--	6.51E+02	--	
Hexachlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E+00	--	7.10E+01	--	
Hexachlorobutadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	--	2.00E+03	--	
Hexachloroethane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--	
Pentachlorophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E+00	--	2.27E+01	--	

Table H26-4
Refined Exposure Evaluation - Mink
Cedar Creek
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Analyte	Exposure Point Concentrations (EPCs)		Mink Dose (mg/kg bw-day)									
			Diet			Water	Substrate	Total Dose ^c	TRV _{NOAEL}	HQ _{NOAEL}	TRV _{LOAEL}	HQ _{LOAEL}
	Refined Sediment Concentration (mg/kg, dw)	Refined Surface Water Concentration ^a (mg/L)	Invertebrates	Fish	Dose _{diet}	Dose _{water}	Dose _{substrate}					
Volatile Organic Compounds (VOCs)												
Methylcyclohexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	No TRV	--	No TRV	--
Dioxin/Furans												
2,3,7,8-TCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDD	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,7,8-TCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,7,8-PeCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
2,3,4,6,7,8-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,7,8,9-HxCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,6,7,8-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
1,2,3,4,7,8,9-HpCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
OCDF	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00				
Total Dioxins/Furans					0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.62E-07	--	3.76E-06	--

Notes:

a, Dietary dose calculated as:

$$ADD_{diet} = \frac{IR_{diet} \times \sum (B[S]AF \times C_{substrate} \times DF_i) \times AUF}{BW}$$

b, Substrate dose calculated as:

$$ADD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

c, Total dose calculated as:

$$ADD_{total} = ADD_{diet} + ADD_{water} + ADD_{substrate}$$

--, HQ could not be calculated because TRV was not available.

where:

- ADD_{diet}

IR_{diet}

B(S)AF

C_{substrate}

DF_i

AUF

BW

ADD_{substrate}

IR_s

C_{substrate}
- = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)

= Ingestion rate of food (kg food ingested per day, dry weight)

= Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

= Dietary fraction of food item i (proportion of food type in the diet)

= Area use factor includes seasonal use rates , area use rates, COPEC assimilation rate

= Body weight of the receptor, wet weight (kg)

= Dose of COPEC from incidental substrate ingestion (mg COPEC/kg body weight-day)

= Incidental Ingestion Rate of soil (kg substrate ingested per day, dry weight)

= COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)



Appendix I ProUCL Output

Table I-1
Upper Confidence Limit of the Mean Concentration (UCL_{mean})
Descriptions of ProUCL 5.1 Calculation Methods
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

EPA ProUCL 5.1 Software Upper Confidence Limit (UCL) Method	Description
90% Chebyshev (Mean, Sd) UCL	90% UCL based upon Chebyshev inequality
95% Adjusted Gamma UCL	95% UCL based upon adjusted gamma distribution
95% Adjusted-CLT UCL	95% UCL based upon the adjusted central limit theorem
95% Approximate Gamma UCL	95% UCL based upon chi-square approximation
95% Chebyshev (Mean, Sd) UCL	95% UCL based upon Chebyshev inequality
95% KM (Chebyshev) UCL	95% UCL based upon Kaplan-Meier estimates using Chebyshev inequality
95% KM (t) UCL	95% UCL based upon Kaplan-Meier estimates using the Student's t-distribution critical value
95% KM Adjusted Gamma UCL	95% UCL based upon Kaplan-Meier adjusted gamma distribution
95% KM Approximate Gamma UCL	95% UCL based upon Kaplan-Meier approximation
95% KM Bootstrap t UCL	95% UCL based upon Kaplan-Meier estimates using percentile bootstrap method
95% Student's-t UCL	95% UCL based upon Student's-t distribution
97.5% KM (Chebyshev) UCL	97.5% UCL based upon Kaplan-Meier estimates using Chebyshev inequality
99% KM (Chebyshev) UCL	99% UCL based upon Kaplan-Meier estimates using Chebyshev inequality
Gamma Adjusted KM-UCL	95% UCL based upon Kaplan-Meier adjusted gamma distribution

Notes:

UCL = Upper Confidence Limit

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Main Plant Area				
TAL Metals (mg/kg)				
Aluminum	72	72	95% Student's-t UCL	15,645
Antimony	72	6	95% KM (t) UCL	0.272
Arsenic	72	72	95% Student's-t UCL	4.81
Barium	72	72	95% Student's-t UCL	121.1
Cadmium	72	13	95% KM Approximate Gamma UCL	0.354
Chromium, Hexavalent	73	72	95% KM (t) UCL	0.408
Chromium, Total	73	73	95% Student's-t UCL	15.6
Chromium, Trivalent	73	73	95% Student's-t UCL	15.2
Cobalt	72	72	95% Student's-t UCL	5.29
Copper	72	72	95% Student's-t UCL	16.4
Iron	72	72	95% Student's-t UCL	13,815
Lead	72	72	95% Chebyshev (Mean, Sd) UCL	22.0
Manganese	72	72	95% Student's-t UCL	437.4
Mercury	72	64	KM Student's t	0.021
Nickel	72	72	95% Chebyshev (Mean, Sd) UCL	31.7
Selenium	72	4	95% KM (t) UCL	0.265
Thallium	72	0	--	--
Vanadium	72	72	95% Approximate Gamma UCL	13.6
Zinc	72	72	95% Student's-t UCL	58.8
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	72	64	95% KM Chebyshev UCL	0.239
Fluoride	72	72	95% Chebyshev(Mean, Sd) UCL	118.8
Essential Nutrients (mg/kg)				
Calcium	72	72	95% Student's-t UCL	22,490
Magnesium	72	72	95% Student's-t UCL	10,300
Potassium	72	72	95% Student's-t UCL	889.3
Sodium	72	56	95% KM (Chebyshev) UCL	480.9
Dioxins and Furans (mg/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzofuran	29	25	Gamma Adjusted KM-UCL	1.56E-05
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	29	27	95% KM Chebyshev UCL	1.50E-04
1,2,3,4,7,8,9-Heptachlorodibenzofuran	29	7	95% KM (t) UCL	7.12E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	29	20	95% KM Chebyshev UCL	2.23E-06
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	29	12	Gamma Adjusted KM-UCL	1.14E-06
1,2,3,6,7,8-Hexachlorodibenzofuran	29	23	Gamma Adjusted KM-UCL	1.03E-06
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	29	24	95% KM Chebyshev UCL	5.41E-06
1,2,3,7,8,9-Hexachlorodibenzofuran	29	0	--	--
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	29	25	95% KM Chebyshev UCL	3.08E-06
1,2,3,7,8-Pentachlorodibenzofuran	29	11	95% KM (t) UCL	6.01E-07
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	29	16	95% KM Chebyshev UCL	5.83E-07
2,3,4,6,7,8-Hexachlorodibenzofuran	29	17	97.5% KM Chebyshev UCL	1.13E-06
2,3,4,7,8-Pentachlorodibenzofuran	29	18	95% KM Chebyshev UCL	1.07E-06
2,3,7,8-Tetrachlorodibenzofuran	29	18	95% KM (Chebyshev) UCL	2.27E-06
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	29	10	95% KM (t) UCL	1.48E-07
Octachlorodibenzofuran	29	24	Gamma Adjusted KM-UCL	4.24E-05
Octachlorodibenzo-P-Dioxin	29	27	95% KM Chebyshev UCL	0.002
TEC2,3,7,8-TCDD-Bird-1/2MDL	29	29	95% Adjusted Gamma UCL	3.86E-06
TEC2,3,7,8-TCDD-Bird-MDL	29	29	95% Adjusted Gamma UCL	4.18E-06
TEC2,3,7,8-TCDD-Bird-Zero	29	29	95% Adjusted Gamma UCL	3.86E-06
TEC2,3,7,8-TCDD-Mammal-1/2MDL	29	29	95% Adjusted Gamma UCL	3.18E-06
TEC2,3,7,8-TCDD-Mammal-MDL	29	29	95% Chebyshev(Mean, Sd) UCL	4.86E-06
TEC2,3,7,8-TCDD-Mammal-Zero	29	29	95% Adjusted Gamma UCL	3.17E-06
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1254 (Aroclor 1254)	64	3	--	--
Polychlorinated Biphenyl (PCBs)	64	3	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	72	62	95% KM (Chebyshev) UCL	1.48
Anthracene	72	59	95% KM Chebyshev UCL	2.58
Benzo(A)Anthracene	72	68	95% KM Chebyshev UCL	12.8
Benzo(A)Pyrene	72	70	95% KM Chebyshev UCL	14.9
Benzo(B)Fluoranthene	72	71	95% KM Chebyshev UCL	18.3
Benzo(G,H,I)Perylene	72	71	95% KM Chebyshev UCL	12.9
Chrysene	72	71	95% KM Chebyshev UCL	15.7
Dibenz(A,H)Anthracene	72	64	95% KM Chebyshev UCL	3.29

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Fluoranthene	72	71	95% KM Chebyshev UCL	20.5
Fluorene	72	59	95% KM (Chebyshev) UCL	1.000
Indeno(1,2,3-C,D)Pyrene	72	71	95% KM Chebyshev UCL	12.3
Naphthalene	72	51	95% KM (Chebyshev) UCL	0.524
Phenanthrene	72	71	95% KM Chebyshev UCL	13.2
Pyrene	72	71	95% KM Chebyshev UCL	25.1
Total HMW PAHs - 1/2MDL	71	71	95% Chebyshev(Mean, Sd) UCL	124.4
Total HMW PAHs - MDL	71	71	95% Chebyshev(Mean, Sd) UCL	124.4
Total HMW PAHs - Zero	71	71	95% Chebyshev(Mean, Sd) UCL	124.4
Total LMW PAHs - 1/2MDL	71	71	95% Chebyshev (Mean, Sd) UCL	39.9
Total LMW PAHs - MDL	71	71	95% Chebyshev (Mean, Sd) UCL	39.9
Total LMW PAHs - Zero	71	71	95% Chebyshev(Mean, Sd) UCL	39.8
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
3- And 4- Methylphenol (Total)	56	1	--	--
Benzaldehyde	72	4	95% KM (t) UCL	0.010
Benzyl Butyl Phthalate	72	18	95% KM Chebyshev UCL	0.591
Bis(2-Ethylhexyl) Phthalate	72	27	95% KM Chebyshev UCL	0.532
Di-N-Butyl Phthalate	72	11	95% KM (t) UCL	0.019
Hexachlorobenzene	72	0	--	--
Pentachlorophenol	72	2	--	--
Cedar Creek Area				
TAL Metals (mg/kg)				
Barium	9	9	95% Student's-t UCL	165.0
Beryllium	9	9	95% Student's-t UCL	0.446
Manganese	9	9	95% Student's-t UCL	348.9
Vanadium	9	9	95% Student's-t UCL	7.99
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	9	4	95% KM (t) UCL	0.160
Essential Nutrients (mg/kg)				
Calcium	9	9	95% Student's-t UCL	22,760
Magnesium	9	9	95% Student's-t UCL	10,857
Potassium	9	9	95% Student's-t UCL	829.5
Sodium	9	5	95% KM (t) UCL	107.5
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	9	2	--	--
Acenaphthylene	9	3	--	--
Anthracene	9	3	--	--
Benzo(A)Anthracene	9	5	95% KM (t) UCL	0.073
Benzo(A)Pyrene	9	6	95% KM (t) UCL	0.062
Benzo(G,H,I)Perylene	9	4	95% KM (t) UCL	0.052
Chrysene	9	8	95% KM (t) UCL	0.087
Fluoranthene	9	9	95% Student's-t UCL	0.129
Fluorene	9	2	--	--
Indeno(1,2,3-C,D)Pyrene	9	4	95% KM (t) UCL	0.049
Phenanthrene	9	8	95% KM (t) UCL	0.140
Pyrene	9	7	95% KM (t) UCL	0.110
Total HMW PAHs - 1/2MDL	8	8	95% Student's-t UCL	0.586
Total HMW PAHs - MDL	8	8	95% Student's-t UCL	0.649
Total HMW PAHs - Zero	8	8	95% Student's-t UCL	0.539
Total LMW PAHs - 1/2MDL	9	9	95% Student's-t UCL	0.371
Total LMW PAHs - MDL	9	9	95% Student's-t UCL	0.434
Total LMW PAHs - Zero	9	9	95% Student's-t UCL	0.315
Total PAHs - 1/2MDL	9	9	95% Student's-t UCL	0.826
Total PAHs - MDL	9	9	95% Student's-t UCL	0.938
Total PAHs - Zero	9	9	95% Student's-t UCL	0.731
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Benzaldehyde	9	3	--	--
Carbazole	9	2	--	--
Cedar Creek Reservoir Overflow Ditch Area				
TAL Metals (mg/kg)				
Aluminum	8	8	95% Student's-t UCL	19,985
Arsenic	8	8	95% Student's-t UCL	6.83
Barium	8	8	95% Student's-t UCL	274.1
Beryllium	8	8	95% Student's-t UCL	0.874
Chromium, Hexavalent	3	3	--	--

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Chromium, Trivalent	3	3	--	--
Cobalt	8	8	95% Student's-t UCL	8.26
Copper	8	8	95% Student's-t UCL	24.1
Iron	8	8	95% Student's-t UCL	18,632
Lead	8	8	95% Student's-t UCL	17.1
Manganese	8	8	95% Student's-t UCL	1,349
Nickel	8	8	95% Student's-t UCL	32.3
Selenium	8	6	KM Student's t	0.788
Vanadium	8	8	95% Student's-t UCL	14.9
Zinc	8	8	95% Student's-t UCL	110.1
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	8	8	95% Student's-t UCL	0.832
Essential Nutrients (mg/kg)				
Calcium	8	8	95% Student's-t UCL	24,617
Magnesium	8	8	95% Student's-t UCL	11,615
Potassium	8	8	95% Student's-t UCL	1,400
Sodium	8	5	95% KM (t) UCL	115.6
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	8	6	95% KM (t) UCL	0.061
Anthracene	8	6	95% KM (t) UCL	0.118
Benzo(A)Anthracene	8	8	95% Student's-t UCL	0.781
Benzo(A)Pyrene	8	8	95% Student's-t UCL	1.05
Benzo(G,H,I)Perylene	8	8	95% Student's-t UCL	1.05
Benzo(K)Fluoranthene	8	8	95% Student's-t UCL	0.538
Chrysene	8	8	95% Student's-t UCL	1.12
Dibenz(A,H)Anthracene	8	6	95% KM (t) UCL	0.226
Fluoranthene	8	8	95% Student's-t UCL	1.30
Fluorene	8	6	95% KM (t) UCL	0.039
Indeno(1,2,3-C,D)Pyrene	8	8	95% Student's-t UCL	0.971
Naphthalene	8	6	95% KM (t) UCL	0.028
Phenanthrene	8	8	95% Student's-t UCL	0.659
Pyrene	8	8	95% Student's-t UCL	1.34
Total HMW PAHs - 1/2MDL	8	8	95% Student's-t UCL	8.50
Total HMW PAHs - MDL	8	8	95% Student's-t UCL	8.50
Total HMW PAHs - Zero	8	8	95% Student's-t UCL	8.50
Total LMW PAHs - 1/2MDL	8	8	95% Student's-t UCL	2.21
Total LMW PAHs - MDL	8	8	95% Student's-t UCL	2.21
Total LMW PAHs - Zero	8	8	95% Student's-t UCL	2.20
Total PAHs - 1/2MDL	8	8	95% Student's-t UCL	9.20
Total PAHs - MDL	8	8	95% Student's-t UCL	9.20
Total PAHs - Zero	8	8	95% Student's-t UCL	9.19
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Acetophenone	8	1	--	--
Benzaldehyde	8	2	--	--
Bis(2-Ethylhexyl) Phthalate	8	1	--	--
Carbazole	8	8	95% Student's-t UCL	0.133
Di-N-Butyl Phthalate	8	1	--	--
South Percolation Pond Area				
TAL Metals (mg/kg)				
Aluminum	26	26	95% Student's-t UCL	9,034
Antimony	26	1	--	--
Barium	26	26	95% Student's-t UCL	640.1
Beryllium	26	17	95% KM (t) UCL	0.420
Cadmium	26	3	--	--
Chromium, Hexavalent	12	12	95% Adjusted Gamma UCL	0.425
Chromium, Total	26	26	95% Adjusted Gamma UCL	11.4
Chromium, Trivalent	12	12	95% Adjusted Gamma UCL	15.4
Cobalt	26	24	95% KM (t) UCL	4.30
Copper	26	26	95% Chebyshev(Mean, Sd) UCL	203.0
Iron	26	26	95% Student's-t UCL	8,609
Lead	26	26	95% Chebyshev(Mean, Sd) UCL	34.4
Manganese	26	26	95% Student's-t UCL	111.2
Mercury	26	22	95% KM (Chebyshev) UCL	0.349
Nickel	26	26	95% Adjusted Gamma UCL	19.0
Selenium	26	6	95% KM (t) UCL	0.572

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Silver	26	2	--	--
Thallium	26	1	--	--
Vanadium	26	26	95% Student's-t UCL	11.8
Zinc	26	26	95% Adjusted Gamma UCL	115.6
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	26	22	95% KM Chebyshev UCL	4.43
Cyanide (Free)	2	1	--	--
Essential Nutrients (mg/kg)				
Calcium	26	26	95% Student's-t UCL	196,766
Magnesium	26	26	95% Student's-t UCL	8,877
Potassium	26	26	95% Student's-t UCL	871.0
Sodium	26	22	95% KM Adjusted Gamma UCL	237.0
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	26	3	--	--
Anthracene	26	5	95% KM Adjusted Gamma UCL	0.036
Benzo(A)Anthracene	26	24	95% KM Adjusted Gamma UCL	0.246
Benzo(A)Pyrene	26	23	95% KM Chebyshev UCL	0.821
Benzo(G,H,I)Perylene	26	24	95% KM Adjusted Gamma UCL	0.726
Benzo(K)Fluoranthene	26	24	95% KM Adjusted Gamma UCL	0.234
Chrysene	26	25	95% KM Chebyshev UCL	0.912
Dibenz(A,H)Anthracene	26	16	95% KM Chebyshev UCL	0.132
Fluoranthene	26	25	95% KM Chebyshev UCL	0.617
Fluorene	26	2	--	--
Indeno(1,2,3-C,D)Pyrene	26	24	95% KM Chebyshev UCL	0.984
Phenanthrene	26	25	95% KM Adjusted Gamma UCL	0.201
Pyrene	26	24	95% KM Chebyshev UCL	0.516
Total HMW PAHs - 1/2MDL	25	25	95% Adjusted Gamma UCL	4.50
Total HMW PAHs - MDL	25	25	95% Adjusted Gamma UCL	4.55
Total HMW PAHs - Zero	25	25	95% Adjusted Gamma UCL	4.46
Total LMW PAHs - 1/2MDL	25	25	95% Chebyshev(Mean, Sd) UCL	1.09
Total LMW PAHs - MDL	25	25	95% Chebyshev(Mean, Sd) UCL	1.27
Total LMW PAHs - Zero	25	25	95% Adjusted Gamma UCL	0.694
Total PAHs - 1/2MDL	25	25	95% Adjusted Gamma UCL	4.24
Total PAHs - MDL	25	25	95% Adjusted Gamma UCL	4.39
Total PAHs - Zero	25	25	95% Adjusted Gamma UCL	4.09
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
3- And 4- Methylphenol (Total)	20	1	--	--
4-Chloroaniline	26	2	--	--
Benzaldehyde	26	1	--	--
Bis(2-Ethylhexyl) Phthalate	26	2	--	--
Carbazole	26	18	95% KM Chebyshev UCL	0.244
Di-N-Butyl Phthalate	26	3	--	--
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Acetone	5	5	95% Student's-t UCL	0.241
Carbon Disulfide	5	5	95% Student's-t UCL	0.009
Cyclohexane	5	2	--	--
M,P-Xylene	5	2	--	--
Methyl Acetate	5	0	--	--
Methyl Ethyl Ketone (2-Butanone)	5	5	95% Student's-t UCL	0.065
Methylcyclohexane	5	2	--	--
O-Xylene (1,2-Dimethylbenzene)	5	1	--	--
Northern Surface Water Feature Area				
TAL Metals (mg/kg)				
Aluminum	12	12	95% Adjusted Gamma UCL	25,796
Arsenic	12	12	95% Student's-t UCL	9.33
Barium	12	12	95% Student's-t UCL	586.4
Beryllium	12	10	95% KM (t) UCL	0.763
Cobalt	12	12	95% Student's-t UCL	5.55
Copper	12	12	95% Student's-t UCL	26.1
Iron	12	12	95% Student's-t UCL	16,716
Lead	12	12	95% Student's-t UCL	13.5
Manganese	12	12	95% Student's-t UCL	479.9
Nickel	12	12	95% Student's-t UCL	12.4
Selenium	12	4	95% KM (t) UCL	1.62
Vanadium	12	12	95% Student's-t UCL	12.9

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Zinc	12	12	95% Student's-t UCL	43.1
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	12	7	95% KM (t) UCL	0.411
Essential Nutrients (mg/kg)				
Calcium	12	12	95% Student's-t UCL	10,678
Magnesium	12	12	95% Student's-t UCL	8,109
Potassium	12	12	95% Student's-t UCL	1,048
Sodium	12	11	95% KM (t) UCL	470.1
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Anthracene	12	3	--	--
Benzo(A)Anthracene	12	10	95% KM (t) UCL	0.049
Benzo(A)Pyrene	12	11	95% KM (t) UCL	0.064
Benzo(G,H,I)Perylene	12	11	95% KM (t) UCL	0.065
Chrysene	12	11	95% KM (t) UCL	0.098
Dibenz(A,H)Anthracene	12	7	95% KM (t) UCL	0.013
Fluoranthene	12	11	95% KM (t) UCL	0.093
Indeno(1,2,3-C,D)Pyrene	12	11	95% KM (t) UCL	0.052
Phenanthrene	12	11	95% KM (t) UCL	0.052
Pyrene	12	11	95% KM (t) UCL	0.081
Total HMW PAHs - 1/2MDL	11	11	95% Student's-t UCL	0.592
Total HMW PAHs - MDL	11	11	95% Student's-t UCL	0.596
Total HMW PAHs - Zero	11	11	95% Student's-t UCL	0.588
Total LMW PAHs - 1/2MDL	11	11	95% Student's-t UCL	0.185
Total LMW PAHs - MDL	11	11	95% Student's-t UCL	0.214
Total LMW PAHs - Zero	11	11	95% Student's-t UCL	0.158
Total PAHs - 1/2MDL	11	11	95% Student's-t UCL	0.664
Total PAHs - MDL	11	11	95% Student's-t UCL	0.692
Total PAHs - Zero	11	11	95% Student's-t UCL	0.638
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Acetophenone	12	1	--	--
Benzaldehyde	12	2	--	--
Carbazole	12	9	95% KM (t) UCL	0.015
Phenol	12	1	--	--
North Percolation Pond Area				
TAL Metals (mg/kg)				
Aluminum	22	22	95% Adjusted Gamma UCL	50,414
Antimony	22	7	95% KM (t) UCL	0.930
Arsenic	22	22	95% Adjusted Gamma UCL	13.5
Barium	22	22	95% Student's-t UCL	244.6
Beryllium	22	22	95% Adjusted Gamma UCL	3.99
Cadmium	22	21	95% KM Adjusted Gamma UCL	3.62
Chromium, Hexavalent	22	20	95% KM (t) UCL	0.692
Chromium, Total	24	24	95% Student's-t UCL	28.7
Chromium, Trivalent	22	22	95% Student's-t UCL	25.4
Cobalt	22	22	95% Adjusted Gamma UCL	9.47
Copper	22	22	95% Student's-t UCL	44.3
Iron	22	22	95% Student's-t UCL	9,375
Lead	22	22	95% Chebyshev(Mean, Sd) UCL	110.7
Manganese	22	22	95% Adjusted Gamma UCL	211.1
Mercury	22	18	95% KM Chebyshev UCL	0.063
Nickel	22	22	95% Adjusted Gamma UCL	359.8
Selenium	22	16	95% KM Chebyshev UCL	1.83
Silver	22	2	--	--
Thallium	22	19	95% KM (Chebyshev) UCL	1.89
Vanadium	22	22	95% Adjusted Gamma UCL	110.4
Zinc	22	22	95% Adjusted Gamma UCL	342.4
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	22	22	95% Chebyshev (Mean, Sd) UCL	41.2
Fluoride	22	22	95% Adjusted Gamma UCL	146.6
Essential Nutrients (mg/kg)				
Calcium	22	22	95% Adjusted Gamma UCL	33,122
Magnesium	22	22	95% Student's-t UCL	6,051
Potassium	22	22	95% Student's-t UCL	852.9
Sodium	22	21	95% KM (Chebyshev) UCL	862.8
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
2-Methylnaphthalene	22	18	Gamma Adjusted KM-UCL	2.16
Acenaphthene	22	22	97.5% Chebyshev (Mean, Sd) UCL	81.9
Acenaphthylene	22	6	95% KM (t) UCL	0.320
Anthracene	22	22	97.5% Chebyshev (Mean, Sd) UCL	113.0
Benzo(A)Anthracene	22	21	97.5% KM (Chebyshev) UCL	1,119
Benzo(A)Pyrene	22	21	97.5% KM (Chebyshev) UCL	1,269
Benzo(B)Fluoranthene	22	21	95% KM (Chebyshev) UCL	1,004
Benzo(G,H,I)Perylene	22	21	95% KM (Chebyshev) UCL	699.3
Benzo(K)Fluoranthene	22	21	95% KM (Chebyshev) UCL	720.2
Chrysene	22	21	97.5% KM (Chebyshev) UCL	1,166
Dibenz(A,H)Anthracene	22	21	95% KM (Chebyshev) UCL	236.6
Fluoranthene	22	22	99% Chebyshev (Mean, Sd) UCL	2,235
Fluorene	22	19	Gamma Adjusted KM-UCL	25.7
Indeno(1,2,3-C,D)Pyrene	22	21	95% KM (Chebyshev) UCL	643.0
Naphthalene	22	16	Gamma Adjusted KM-UCL	3.65
Phenanthrene	22	22	95% Adjusted Gamma UCL	285.2
Pyrene	22	22	99% Chebyshev (Mean, Sd) UCL	1,965
Total HMW PAHs - 1/2MDL	22	22	99% Chebyshev (Mean, Sd) UCL	13,433
Total HMW PAHs - MDL	22	22	97.5% Chebyshev (Mean, Sd) UCL	9,208
Total HMW PAHs - Zero	22	22	99% Chebyshev (Mean, Sd) UCL	13,433
Total LMW PAHs - 1/2MDL	22	22	97.5% Chebyshev (Mean, Sd) UCL	2,318
Total LMW PAHs - MDL	22	22	97.5% Chebyshev (Mean, Sd) UCL	2,328
Total LMW PAHs - Zero	22	22	97.5% Chebyshev (Mean, Sd) UCL	2,307
Total PAHs - 1/2MDL	22	22	97.5% Chebyshev (Mean, Sd) UCL	10,218
Total PAHs - MDL	22	22	97.5% Chebyshev (Mean, Sd) UCL	10,227
Total PAHs - Zero	22	22	97.5% Chebyshev (Mean, Sd) UCL	10,209
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Acetophenone	22	1	--	--
Benzyl Butyl Phthalate	22	1	--	--
Bis(2-Ethylhexyl) Phthalate	22	2	--	--
Carbazole	22	21	95% KM (Chebyshev) UCL	53.7
Dibenzofuran	22	21	Gamma Adjusted KM-UCL	7.70
Central Landfills Area				
TAL Metals (mg/kg)				
Aluminum	55	55	95% Student's-t UCL	15,561
Antimony	55	2	--	--
Arsenic	55	55	95% Approximate Gamma UCL	6.57
Barium	55	55	95% Chebyshev(Mean, Sd) UCL	196.6
Beryllium	55	55	95% Approximate Gamma UCL	0.601
Cadmium	55	1	--	--
Chromium, Hexavalent	59	55	95% KM (t) UCL	0.361
Chromium, Total	59	58	95% KM (t) UCL	13.8
Chromium, Trivalent	59	58	95% KM (t) UCL	13.4
Cobalt	55	55	95% Student's-t UCL	5.72
Copper	55	55	95% Chebyshev (Mean, Sd) UCL	720.9
Iron	55	55	95% Student's-t UCL	16,333
Lead	55	55	95% Student's-t UCL	14.8
Manganese	55	55	95% Student's-t UCL	511.1
Nickel	55	55	95% Student's-t UCL	23.5
Selenium	55	10	KM Student's t	0.325
Thallium	55	7	95% KM (t) UCL	0.111
Vanadium	55	55	95% Approximate Gamma UCL	14.7
Zinc	55	55	95% Approximate Gamma UCL	56.0
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	55	41	95% KM Chebyshev UCL	1.18
Fluoride	55	55	95% Chebyshev(Mean, Sd) UCL	140.0
Essential Nutrients (mg/kg)				
Calcium	55	55	95% Approximate Gamma UCL	33,545
Magnesium	55	55	95% Student's-t UCL	10,507
Potassium	55	55	95% Student's-t UCL	1,077
Sodium	55	37	95% KM (Chebyshev) UCL	618.3
Dioxins and Furans (mg/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2	1	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2	2	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	2	1	--	--

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
1,2,3,6,7,8-Hexachlorodibenzofuran	2	2	--	--
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2	1	--	--
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2	1	--	--
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2	1	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran	2	1	--	--
2,3,4,7,8-Pentachlorodibenzofuran	2	1	--	--
2,3,7,8-Tetrachlorodibenzofuran	2	1	--	--
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2	0	--	--
Octachlorodibenzofuran	2	1	--	--
Octachlorodibenzo-P-Dioxin	2	2	--	--
TEC2,3,7,8-TCDD-Bird-1/2MDL	2	2	--	--
TEC2,3,7,8-TCDD-Bird-MDL	2	2	--	--
TEC2,3,7,8-TCDD-Bird-Zero	2	2	--	--
TEC2,3,7,8-TCDD-Mammal-1/2MDL	2	2	--	--
TEC2,3,7,8-TCDD-Mammal-MDL	2	2	--	--
TEC2,3,7,8-TCDD-Mammal-Zero	2	2	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1254 (Aroclor 1254)	35	2	--	--
Polychlorinated Biphenyl (PCBs)	35	2	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	55	21	95% KM Approximate Gamma UCL	0.213
Acenaphthene	55	45	95% KM (Chebyshev) UCL	2.24
Anthracene	55	45	95% KM (Chebyshev) UCL	4.76
Benzo(A)Anthracene	55	53	95% KM (Chebyshev) UCL	10.7
Benzo(A)Pyrene	55	53	95% KM (Chebyshev) UCL	10.9
Benzo(B)Fluoranthene	55	53	95% KM (Chebyshev) UCL	13.4
Benzo(G,H,I)Perylene	55	53	95% KM (Chebyshev) UCL	7.33
Chrysene	55	55	95% Chebyshev (Mean, Sd) UCL	12.1
Dibenz(A,H)Anthracene	55	50	95% KM (Chebyshev) UCL	2.34
Fluoranthene	55	54	95% KM (Chebyshev) UCL	25.0
Fluorene	55	45	95% KM (Chebyshev) UCL	1.92
Indeno(1,2,3-C,D)Pyrene	55	53	95% KM (Chebyshev) UCL	8.68
Naphthalene	55	33	95% KM Chebyshev UCL	0.484
Phenanthrene	55	54	95% KM (Chebyshev) UCL	18.4
Pyrene	55	53	95% KM (Chebyshev) UCL	16.3
Total HMW PAHs - 1/2MDL	55	55	95% Chebyshev (Mean, Sd) UCL	87.2
Total HMW PAHs - MDL	55	55	95% Chebyshev (Mean, Sd) UCL	87.2
Total HMW PAHs - Zero	55	55	95% Chebyshev (Mean, Sd) UCL	87.2
Total LMW PAHs - 1/2MDL	54	54	95% Chebyshev (Mean, Sd) UCL	54.0
Total LMW PAHs - MDL	54	54	95% Chebyshev (Mean, Sd) UCL	54.0
Total LMW PAHs - Zero	54	54	95% Chebyshev (Mean, Sd) UCL	54.0
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
3- And 4- Methylphenol (Total)	27	2	--	--
Benzaldehyde	55	7	95% KM Approximate Gamma UCL	0.011
Benzyl Butyl Phthalate	55	4	95% KM Approximate Gamma UCL	0.097
Bis(2-Ethylhexyl) Phthalate	55	11	95% KM (Chebyshev) UCL	0.279
Caprolactam	55	1	--	--
Dibenzofuran	55	34	95% KM Chebyshev UCL	1.01
Di-N-Butyl Phthalate	55	4	95% KM (t) UCL	0.016
Phenol	55	3	--	--
Industrial Landfill Area				
TAL Metals (mg/kg)				
Aluminum	6	6	95% Student's-t UCL	29,605
Antimony	6	3	--	--
Arsenic	6	6	95% Chebyshev (Mean, Sd) UCL	21.8
Barium	6	6	90% Chebyshev(Mean, Sd) UCL	221.4
Beryllium	6	6	95% Chebyshev (Mean, Sd) UCL	6.49
Cadmium	6	2	--	--
Chromium, Hexavalent	6	6	95% Adjusted Gamma UCL	0.957
Chromium, Total	6	6	95% Adjusted Gamma UCL	35.8
Chromium, Trivalent	6	6	95% Adjusted Gamma UCL	34.8
Cobalt	6	6	95% Student's-t UCL	10.9
Copper	6	6	95% Adjusted Gamma UCL	50.6
Iron	6	6	95% Student's-t UCL	18,180
Lead	6	6	95% Student's-t UCL	16.7

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Manganese	6	6	95% Student's-t UCL	421.6
Nickel	6	6	95% Chebyshev(Mean, Sd) UCL	417.8
Selenium	6	3	--	--
Thallium	6	2	--	--
Vanadium	6	6	95% Chebyshev(Mean, Sd) UCL	153.2
Zinc	6	6	95% Student's-t UCL	65.0
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	6	1	--	--
Fluoride	6	6	95% Chebyshev(Mean, Sd) UCL	357.6
Essential Nutrients (mg/kg)				
Calcium	6	6	95% Student's-t UCL	45,432
Magnesium	6	6	95% Student's-t UCL	13,268
Potassium	6	6	95% Chebyshev (Mean, Sd) UCL	6,140
Sodium	6	6	95% Chebyshev(Mean, Sd) UCL	43,952
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	6	6	90% Chebyshev(Mean, Sd) UCL	2.77
Benzo(A)Anthracene	6	6	95% Chebyshev(Mean, Sd) UCL	41.7
Benzo(A)Pyrene	6	6	95% Chebyshev(Mean, Sd) UCL	51.3
Benzo(B)Fluoranthene	6	6	95% Chebyshev(Mean, Sd) UCL	57.4
Benzo(G,H,I)Perylene	6	6	95% Chebyshev(Mean, Sd) UCL	42.8
Chrysene	6	6	95% Chebyshev(Mean, Sd) UCL	49.0
Fluoranthene	6	6	95% Chebyshev(Mean, Sd) UCL	67.3
Naphthalene	6	5	95% KM Chebyshev UCL	1.64
Phenanthrene	6	6	95% Chebyshev(Mean, Sd) UCL	36.5
Pyrene	6	6	95% Chebyshev(Mean, Sd) UCL	63.6
Total HMW PAHs - 1/2MDL	6	6	95% Chebyshev(Mean, Sd) UCL	375.1
Total HMW PAHs - MDL	6	6	95% Chebyshev(Mean, Sd) UCL	375.1
Total HMW PAHs - Zero	6	6	95% Chebyshev(Mean, Sd) UCL	375.1
Total LMW PAHs - 1/2MDL	6	6	95% Chebyshev(Mean, Sd) UCL	117.4
Total LMW PAHs - MDL	6	6	95% Chebyshev(Mean, Sd) UCL	117.4
Total LMW PAHs - Zero	6	6	95% Chebyshev(Mean, Sd) UCL	117.4
Eastern Undeveloped Area				
TAL Metals (mg/kg)				
Aluminum	22	22	95% Student's-t UCL	18,806
Arsenic	22	22	95% Adjusted Gamma UCL	6.38
Barium	22	22	95% Adjusted Gamma UCL	579.4
Cadmium	22	6	95% KM (t) UCL	0.423
Chromium, Hexavalent	22	22	95% Student's-t UCL	0.255
Cobalt	22	22	95% Student's-t UCL	5.36
Copper	22	22	95% Student's-t UCL	13.3
Iron	22	22	95% Student's-t UCL	13,988
Lead	22	22	95% Student's-t UCL	18.5
Manganese	22	22	95% Adjusted Gamma UCL	1,443
Mercury	22	21	95% KM Adjusted Gamma UCL	0.046
Nickel	22	22	95% Chebyshev(Mean, Sd) UCL	40.7
Selenium	22	1	--	--
Thallium	22	4	95% KM (t) UCL	0.116
Vanadium	22	22	95% Student's-t UCL	16.5
Zinc	22	22	95% Adjusted Gamma UCL	80.4
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	22	16	95% KM Adjusted Gamma UCL	0.298
Essential Nutrients (mg/kg)				
Calcium	22	22	95% Adjusted Gamma UCL	15,670
Magnesium	22	22	95% Student's-t UCL	8,868
Potassium	22	22	95% Student's-t UCL	1,284
Sodium	22	15	95% KM (t) UCL	86.7
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Benzo(A)Anthracene	22	20	Gamma Adjusted KM-UCL	0.474
Benzo(A)Pyrene	22	22	95% Adjusted Gamma UCL	0.672
Total HMW PAHs - 1/2MDL	22	22	95% Adjusted Gamma UCL	7.20
Total HMW PAHs - MDL	22	22	95% Adjusted Gamma UCL	7.18
Total HMW PAHs - Zero	22	22	95% Adjusted Gamma UCL	7.21
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
3- And 4- Methylphenol (Total)	7	2	--	--
Benzaldehyde	22	5	Gamma Adjusted KM-UCL	0.018

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Bis(2-Ethylhexyl) Phthalate	22	3	--	--
Di-N-Butyl Phthalate	22	1	--	--
North-Central Undeveloped Area				
TAL Metals (mg/kg)				
Aluminum	27	27	95% Student's-t UCL	17,635
Arsenic	27	27	95% Student's-t UCL	6.26
Barium	27	27	95% Student's-t UCL	295.5
Cadmium	27	2	--	--
Chromium, Hexavalent	27	27	95% Student's-t UCL	0.266
Cobalt	27	27	95% Student's-t UCL	5.83
Copper	27	27	95% Student's-t UCL	13.5
Iron	27	27	95% Student's-t UCL	16,252
Lead	27	27	95% Student's-t UCL	12.9
Manganese	27	27	95% Chebyshev(Mean, Sd) UCL	1,140
Nickel	27	27	95% Adjusted Gamma UCL	15.1
Selenium	27	4	95% KM (t) UCL	0.301
Thallium	27	1	--	--
Vanadium	27	27	95% Student's-t UCL	13.4
Zinc	27	27	95% Student's-t UCL	67.7
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	27	16	95% KM (t) UCL	0.158
Essential Nutrients (mg/kg)				
Calcium	27	27	95% Chebyshev (Mean, Sd) UCL	42,371
Magnesium	27	27	95% Student's-t UCL	8,562
Potassium	27	27	95% Student's-t UCL	1,098
Sodium	27	21	KM Student's t	63.3
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Total HMW PAHs - 1/2MDL	27	27	95% Adjusted Gamma UCL	1.14
Total HMW PAHs - MDL	27	27	95% Adjusted Gamma UCL	1.14
Total HMW PAHs - Zero	27	27	95% Adjusted Gamma UCL	1.14
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Benzaldehyde	27	10	95% KM (t) UCL	0.009
Bis(2-Ethylhexyl) Phthalate	27	11	95% KM (t) UCL	0.121
Western Undeveloped Area				
TAL Metals (mg/kg)				
Aluminum	41	41	95% Student's-t UCL	18,989
Antimony	41	0	--	--
Arsenic	41	41	95% Adjusted Gamma UCL	5.98
Barium	41	41	95% Student's-t UCL	306.7
Beryllium	41	40	95% KM (t) UCL	0.726
Cadmium	41	2	--	--
Chromium, Hexavalent	41	41	95% Student's-t UCL	0.317
Cobalt	41	41	95% Student's-t UCL	5.76
Copper	41	41	95% Student's-t UCL	17.7
Iron	41	41	95% Student's-t UCL	15,367
Lead	41	41	95% Student's-t UCL	15.6
Manganese	41	41	95% Adjusted Gamma UCL	625.9
Nickel	41	41	95% Student's-t UCL	12.0
Selenium	41	14	95% KM (t) UCL	0.446
Thallium	41	0	--	--
Vanadium	41	41	95% Student's-t UCL	12.9
Zinc	41	41	95% Student's-t UCL	67.2
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	41	32	95% KM Chebyshev UCL	0.435
Essential Nutrients (mg/kg)				
Calcium	41	41	95% Chebyshev (Mean, Sd) UCL	30,554
Magnesium	41	41	95% Student's-t UCL	8,471
Potassium	41	41	95% Student's-t UCL	1,100
Sodium	41	34	95% KM Chebyshev UCL	158.7
Dioxins and Furans (mg/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzofuran	10	3	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	10	8	95% KM (t) UCL	4.70E-06
1,2,3,4,7,8-Hexachlorodibenzofuran	10	3	--	--
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	10	1	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran	10	4	95% KM Bootstrap t UCL	--

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	10	3	--	--
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	10	5	95% KM Chebyshev UCL	8.62E-07
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	10	6	95% KM (t) UCL	1.61E-07
2,3,4,6,7,8-Hexachlorodibenzofuran	10	2	--	--
2,3,4,7,8-Pentachlorodibenzofuran	10	2	--	--
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	10	2	--	--
Octachlorodibenzofuran	10	4	95% KM (t) UCL	2.82E-06
Octachlorodibenzo-P-Dioxin	10	9	95% KM (t) UCL	2.52E-05
TEC2,3,7,8-TCDD-Bird-1/2MDL	10	9	95% KM Chebyshev UCL	7.39E-07
TEC2,3,7,8-TCDD-Bird-MDL	10	9	95% KM (t) UCL	1.27E-06
TEC2,3,7,8-TCDD-Bird-Zero	10	9	95% KM Bootstrap t UCL	7.16E-07
TEC2,3,7,8-TCDD-Mammal-1/2MDL	10	9	95% KM Chebyshev UCL	7.50E-07
TEC2,3,7,8-TCDD-Mammal-MDL	10	9	95% KM Adjusted Gamma UCL	1.06E-06
TEC2,3,7,8-TCDD-Mammal-Zero	10	9	95% KM Bootstrap t UCL	7.13E-07
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Total HMW PAHs - 1/2MDL	36	36	95% Adjusted Gamma UCL	0.733
Total HMW PAHs - MDL	36	36	95% Adjusted Gamma UCL	0.738
Total HMW PAHs - Zero	36	36	95% Adjusted Gamma UCL	0.734
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Benzaldehyde	41	5	Gamma Adjusted KM-UCL	0.008
Bis(2-Ethylhexyl) Phthalate	41	6	95% KM (t) UCL	0.049
Di-N-Butyl Phthalate	41	2	--	--
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Cyclohexane	1	0	--	--
M,P-Xylene	1	0	--	--
Methyl Acetate	1	1	--	--
Methylcyclohexane	1	0	--	--
Flathead River Riparian Area				
TAL Metals (mg/kg)				
Aluminum	19	19	95% Student's-t UCL	9,480
Arsenic	19	19	95% Student's-t UCL	4.90
Barium	10	10	95% Student's-t UCL	160.9
Barium	19	19	95% Student's-t UCL	158.1
Beryllium	10	10	95% Student's-t UCL	0.567
Cobalt	19	19	95% Student's-t UCL	6.27
Copper	19	19	95% Student's-t UCL	17.1
Iron	19	19	95% Student's-t UCL	14,681
Lead	19	19	95% Student's-t UCL	10.1
Manganese	19	19	95% Student's-t UCL	362.6
Nickel	19	19	95% Student's-t UCL	14.2
Selenium	19	0	--	--
Thallium	10	1	--	--
Vanadium	10	10	95% Student's-t UCL	18.6
Vanadium	19	19	95% Student's-t UCL	14.4
Zinc	19	19	95% Student's-t UCL	47.0
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	10	10	95% Student's-t UCL	1.05
Cyanide	19	13	Gamma Adjusted KM-UCL	0.876
Essential Nutrients (mg/kg)				
Calcium	10	10	95% Adjusted Gamma UCL	26,325
Calcium	19	19	95% Student's-t UCL	21,120
Magnesium	10	10	95% Student's-t UCL	13,193
Magnesium	19	19	95% Student's-t UCL	11,399
Potassium	10	10	95% Student's-t UCL	1,240
Potassium	19	19	95% Student's-t UCL	1,036
Sodium	10	10	95% Student's-t UCL	135.1
Sodium	19	11	95% KM (t) UCL	117.4
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Benzo(A)Anthracene	10	6	95% KM Adjusted Gamma UCL	0.053
Benzo(A)Pyrene	10	8	95% KM (t) UCL	0.055
Benzo(G,H,I)Perylene	10	8	95% KM (t) UCL	0.053
Chrysene	10	10	95% Adjusted Gamma UCL	0.284
Dibenz(A,H)Anthracene	10	6	95% KM (t) UCL	0.025
Fluoranthene	10	10	95% Chebyshev (Mean, Sd) UCL	0.553
Indeno(1,2,3-C,D)Pyrene	10	8	95% KM (t) UCL	0.077

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Naphthalene	19	3	--	--
Phenanthrene	10	8	95% KM Bootstrap t UCL	0.094
Pyrene	10	10	95% Chebyshev (Mean, Sd) UCL	0.321
Total HMW PAHs - 1/2MDL	10	10	95% Adjusted Gamma UCL	1.05
Total HMW PAHs - 1/2MDL	16	16	95% Student's-t UCL	1.32
Total HMW PAHs - MDL	10	10	95% Adjusted Gamma UCL	1.06
Total HMW PAHs - MDL	16	16	95% Adjusted Gamma UCL	1.43
Total HMW PAHs - Zero	10	10	95% Adjusted Gamma UCL	1.08
Total HMW PAHs - Zero	16	16	95% Student's-t UCL	1.31
Total LMW PAHs - 1/2MDL	10	10	95% Chebyshev(Mean, Sd) UCL	0.677
Total LMW PAHs - MDL	10	10	95% Chebyshev(Mean, Sd) UCL	0.716
Total LMW PAHs - Zero	10	10	95% Chebyshev (Mean, Sd) UCL	0.641
Total PAHs - 1/2MDL	10	10	95% Adjusted Gamma UCL	1.33
Total PAHs - MDL	10	10	95% Adjusted Gamma UCL	1.37
Total PAHs - Zero	10	10	95% Adjusted Gamma UCL	1.37
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Acetophenone	9	1	--	--
Benzaldehyde	9	3	--	--
Benzaldehyde	19	4	95% KM (t) UCL	0.039
Caprolactam	19	0	--	--
Carbazole	9	5	95% KM (t) UCL	0.032
Di-N-Butyl Phthalate	19	1	--	--
Phenol	9	1	--	--
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Acetone	5	5	95% Student's-t UCL	0.039
Carbon Disulfide	5	5	95% Student's-t UCL	0.002
Cyclohexane	5	5	95% Student's-t UCL	0.003
Methylcyclohexane	5	5	95% Student's-t UCL	0.005
Flathead River Area				
TAL Metals (mg/kg)				
Barium	32	32	95% Student's-t UCL	100.2
Beryllium	32	31	95% KM (t) UCL	0.416
Vanadium	32	32	95% Student's-t UCL	15.6
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	32	17	Gamma Adjusted KM-UCL	1.69
Essential Nutrients (mg/kg)				
Calcium	32	32	95% Student's-t UCL	17,596
Magnesium	32	32	95% Student's-t UCL	10,161
Potassium	32	32	95% Student's-t UCL	735.7
Sodium	32	15	95% KM (t) UCL	74.3
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	32	5	95% KM (t) UCL	0.005
Anthracene	32	9	Gamma Adjusted KM-UCL	0.036
Benzo(A)Anthracene	32	17	Gamma Adjusted KM-UCL	0.456
Benzo(A)Pyrene	32	14	Gamma Adjusted KM-UCL	0.194
Benzo(G,H,I)Perylene	32	18	Gamma Adjusted KM-UCL	0.259
Benzo(K)Fluoranthene	32	17	Gamma Adjusted KM-UCL	0.419
Chrysene	32	22	Gamma Adjusted KM-UCL	1.21
Dibenz(A,H)Anthracene	32	9	Gamma Adjusted KM-UCL	0.088
Fluoranthene	32	22	Gamma Adjusted KM-UCL	1.38
Fluorene	32	1	--	--
Indeno(1,2,3-C,D)Pyrene	32	17	Gamma Adjusted KM-UCL	0.303
Naphthalene	32	2	--	--
Phenanthrene	32	21	95% KM (Chebyshev) UCL	0.239
Pyrene	32	21	Gamma Adjusted KM-UCL	1.36
Total HMW PAHs - 1/2MDL	22	22	95% Adjusted Gamma UCL	6.46
Total HMW PAHs - MDL	22	22	95% Adjusted Gamma UCL	6.40
Total HMW PAHs - Zero	22	22	95% Adjusted Gamma UCL	6.55
Total LMW PAHs - 1/2MDL	22	22	95% Adjusted Gamma UCL	2.00
Total LMW PAHs - MDL	22	22	95% Adjusted Gamma UCL	2.01
Total LMW PAHs - Zero	22	22	95% Adjusted Gamma UCL	2.01
Total PAHs - 1/2MDL	22	22	95% Adjusted Gamma UCL	7.27
Total PAHs - MDL	22	22	95% Adjusted Gamma UCL	7.22
Total PAHs - Zero	22	22	95% Adjusted Gamma UCL	7.38
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				

Table I-2
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Soil and Sediment Results (0-0.5 ft) by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
3- And 4- Methylphenol (Total)	15	4	95% KM (t) UCL	0.126
Benzaldehyde	27	2	--	--
Bis(2-Ethylhexyl) Phthalate	27	3	--	--
Carbazole	27	6	Gamma Adjusted KM-UCL	0.106
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Acetone	6	6	95% Student's-t UCL	0.068
Carbon Disulfide	6	6	95% Student's-t UCL	0.008
Cyclohexane	6	6	95% Student's-t UCL	0.003
Methyl Acetate	6	1	--	--
Methylcyclohexane	6	6	95% Student's-t UCL	0.007

Notes:

Data from the 0.00-0.50 ft sampling interval used to calculate UCLs to keep consistent with background statistics.

--: Not enough detected observations to estimate the UCL

mg/kg: milligram per kilogram

TAL: Target Analyte List

TCL: Target Compound List

UCL: Upper Confidence Limit of the Mean

Table I-3
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Depth-Weighted Soil Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Main Plant Area				
TAL Metals (mg/kg)				
Aluminum	81	81	95% Approximate Gamma UCL	12.497
Antimony	81	8	95% KM (t) UCL	0.1480
Arsenic	81	81	95% Student's-t UCL	4.56
Barium	81	81	95% Student's-t UCL	112.0
Cadmium	81	16	95% KM Approximate Gamma UCL	0.1891
Chromium, Hexavalent	82	81	95% KM (t) UCL	0.3176
Chromium, Total	82	82	95% Student's-t UCL	12.10
Cobalt	81	81	95% Approximate Gamma UCL	5.31
Copper	81	81	95% Student's-t UCL	15.52
Lead	81	81	95% Student's-t UCL	13.72
Manganese	81	81	95% Approximate Gamma UCL	428.6
Mercury	81	74	95% KM (t) UCL	0.0251
Nickel	81	81	95% Student's-t UCL	18.44
Selenium	81	7	95% KM (t) UCL	0.1542
Thallium	81	1	--	--
Vanadium	81	81	95% Student's-t UCL	11.58
Zinc	81	81	95% Student's-t UCL	53.12
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	81	74	95% KM Chebyshev UCL	0.2757
Fluoride	81	81	95% Chebyshev(Mean, Sd) UCL	88.05
Dioxins and Furans (mg/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzofuran	29	26	95% KM Chebyshev UCL	1.50E-05
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	29	28	95% KM Chebyshev UCL	9.56E-05
1,2,3,4,7,8,9-Heptachlorodibenzofuran	29	7	95% KM (t) UCL	3.35E-07
1,2,3,4,7,8-Hexachlorodibenzofuran	29	25	95% KM Chebyshev UCL	1.92E-06
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	29	14	Gamma Adjusted KM-UCL	6.41E-07
1,2,3,6,7,8-Hexachlorodibenzofuran	29	27	95% KM Chebyshev UCL	7.62E-07
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	29	25	95% KM Chebyshev UCL	3.32E-06
1,2,3,7,8,9-Hexachlorodibenzofuran	29	2	--	--
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	29	26	95% KM Chebyshev UCL	1.88E-06
1,2,3,7,8-Pentachlorodibenzofuran	29	12	95% KM Adjusted Gamma UCL	3.90E-07
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	29	19	95% KM Chebyshev UCL	3.09E-07
2,3,4,6,7,8-Hexachlorodibenzofuran	29	21	95% KM Chebyshev UCL	8.42E-07
2,3,4,7,8-Pentachlorodibenzofuran	29	22	Gamma Adjusted KM-UCL	5.05E-07
2,3,7,8-Tetrachlorodibenzofuran	29	21	95% KM (t) UCL	7.38E-07
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	29	11	95% KM (t) UCL	6.17E-08
Octachlorodibenzofuran	29	26	95% KM Chebyshev UCL	3.25E-05
Octachlorodibenzo-P-Dioxin	29	28	95% KM (Chebyshev) UCL	0.0011
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1254 (Aroclor 1254)	73	3	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	81	68	95% KM (Chebyshev) UCL	0.5931
Anthracene	81	61	95% KM Chebyshev UCL	1.12
Benzo(A)Anthracene	81	76	95% KM Chebyshev UCL	5.48
Benzo(A)Pyrene	81	80	95% KM Chebyshev UCL	5.98
Benzo(B)Fluoranthene	81	80	95% KM Chebyshev UCL	7.60
Benzo(G,H,I)Perylene	81	79	95% KM Chebyshev UCL	5.37
Chrysene	81	80	95% KM Chebyshev UCL	6.93
Dibenz(A,H)Anthracene	81	68	95% KM Chebyshev UCL	1.28
Fluoranthene	81	80	95% KM Chebyshev UCL	9.95
Fluorene	81	63	95% KM (Chebyshev) UCL	0.4101
Indeno(1,2,3-C,D)Pyrene	81	78	95% KM Chebyshev UCL	5.43
Naphthalene	81	54	95% KM Chebyshev UCL	0.2883
Phenanthrene	81	80	95% KM Chebyshev UCL	5.70
Pyrene	81	80	95% KM Chebyshev UCL	9.91
Total HMW PAHs - 1/2MDL	80	80	95% Chebyshev(Mean, Sd) UCL	51.46
Total HMW PAHs - MDL	80	80	95% Chebyshev(Mean, Sd) UCL	51.46
Total HMW PAHs - Zero	80	80	95% Chebyshev(Mean, Sd) UCL	51.45
Total LMW PAHs - 1/2MDL	80	80	95% Chebyshev(Mean, Sd) UCL	18.25
Total LMW PAHs - MDL	80	80	95% Chebyshev(Mean, Sd) UCL	18.27
Total LMW PAHs - Zero	80	80	95% Chebyshev(Mean, Sd) UCL	18.23

Table I-3
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Depth-Weighted Soil Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Benzyl Butyl Phthalate	81	21	95% KM (Chebyshev) UCL	0.2207
Bis(2-Ethylhexyl) Phthalate	81	34	95% KM Chebyshev UCL	0.1520
Di-N-Butyl Phthalate	81	16	95% KM Chebyshev UCL	0.0192
Hexachlorobenzene	81	1	--	--
Pentachlorophenol	80	3	--	--
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Methylcyclohexane	64	29	95% KM Approximate Gamma UCL	9.64E-04
South Percolation Pond Area				
TAL Metals (mg/kg)				
Aluminum	12	12	95% Student's-t UCL	8,513
Antimony	12	1	--	--
Barium	12	12	95% Student's-t UCL	319.3
Cadmium	12	2	--	--
Chromium, Hexavalent	12	12	95% Student's-t UCL	0.2948
Chromium, Total	12	12	95% Student's-t UCL	11.01
Cobalt	12	12	95% Student's-t UCL	4.65
Copper	12	12	95% Adjusted Gamma UCL	192.8
Lead	12	12	95% Chebyshev (Mean, Sd) UCL	43.00
Manganese	12	12	95% Student's-t UCL	98.84
Mercury	12	11	95% KM (Chebyshev) UCL	0.4900
Nickel	12	12	95% Student's-t UCL	16.41
Selenium	12	3	--	--
Silver	12	2	--	--
Thallium	12	1	--	--
Vanadium	12	12	95% Adjusted Gamma UCL	20.36
Zinc	12	12	95% Adjusted Gamma UCL	120.2
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	12	11	95% KM (Chebyshev) UCL	2.25
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Benzo(A)Anthracene	12	11	95% KM Chebyshev UCL	0.3293
Benzo(A)Pyrene	12	10	95% KM (Chebyshev) UCL	1.71
Total HMW PAHs - 1/2MDL	12	12	95% Adjusted Gamma UCL	6.11
Total HMW PAHs - MDL	12	12	95% Adjusted Gamma UCL	6.10
Total HMW PAHs - Zero	12	12	95% Adjusted Gamma UCL	6.16
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Bis(2-Ethylhexyl) Phthalate	12	3	--	--
Di-N-Butyl Phthalate	12	4	95% KM (t) UCL	0.0226
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Methylcyclohexane	12	7	95% KM Bootstrap t UCL	0.0034
North Percolation Pond Area				
TAL Metals (mg/kg)				
Aluminum	20	20	95% Chebyshev (Mean, Sd) UCL	65,539
Antimony	20	6	95% KM (t) UCL	0.6044
Arsenic	20	20	95% Adjusted Gamma UCL	14.57
Barium	20	20	95% Chebyshev(Mean, Sd) UCL	473.1
Beryllium	20	20	95% Chebyshev (Mean, Sd) UCL	6.46
Cadmium	20	20	95% Adjusted Gamma UCL	3.05
Chromium, Hexavalent	22	20	95% KM (t) UCL	0.5716
Chromium, Total	20	20	95% Student's-t UCL	23.18
Cobalt	20	20	95% Student's-t UCL	7.37
Copper	20	20	95% Student's-t UCL	26.63
Lead	20	20	95% Chebyshev(Mean, Sd) UCL	96.66
Manganese	20	20	95% Adjusted Gamma UCL	273.4
Mercury	20	17	95% KM (t) UCL	0.0313
Nickel	20	20	95% Chebyshev(Mean, Sd) UCL	326.5
Selenium	20	14	95% KM Adjusted Gamma UCL	1.13
Thallium	20	18	95% KM (Chebyshev) UCL	1.99
Vanadium	20	20	95% Adjusted Gamma UCL	76.39
Zinc	20	20	95% Adjusted Gamma UCL	245.2
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	20	20	95% Chebyshev (Mean, Sd) UCL	44.51
Fluoride	20	20	95% Student's-t UCL	109.8

Table I-3
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Depth-Weighted Soil Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	20	20	95% Adjusted Gamma UCL	24.93
Anthracene	20	20	95% Adjusted Gamma UCL	49.04
Benzo(A)Anthracene	20	20	95% Adjusted Gamma UCL	310.7
Benzo(A)Pyrene	20	20	95% Adjusted Gamma UCL	340.2
Benzo(B)Fluoranthene	20	20	95% Chebyshev (Mean, Sd) UCL	521.7
Benzo(G,H,I)Perylene	20	20	95% Adjusted Gamma UCL	245.9
Benzo(K)Fluoranthene	20	20	95% Chebyshev (Mean, Sd) UCL	343.5
Chrysene	20	20	95% Adjusted Gamma UCL	358.4
Dibenz(A,H)Anthracene	20	20	95% Chebyshev (Mean, Sd) UCL	117.4
Fluoranthene	20	20	95% Adjusted Gamma UCL	609.6
Fluorene	20	17	Gamma Adjusted KM-UCL	13.03
Indeno(1,2,3-C,D)Pyrene	20	20	95% Adjusted Gamma UCL	225.2
Naphthalene	20	14	Gamma Adjusted KM-UCL	2.39
Phenanthrene	20	20	95% Adjusted Gamma UCL	200.4
Pyrene	20	20	95% Adjusted Gamma UCL	520.7
Total HMW PAHs - 1/2MDL	20	20	95% Adjusted Gamma UCL	2,670
Total HMW PAHs - MDL	20	20	95% Adjusted Gamma UCL	2,670
Total HMW PAHs - Zero	20	20	95% Adjusted Gamma UCL	2,670
Total LMW PAHs - 1/2MDL	20	20	95% Adjusted Gamma UCL	899.0
Total LMW PAHs - MDL	20	20	95% Adjusted Gamma UCL	900.9
Total LMW PAHs - Zero	20	20	95% Adjusted Gamma UCL	897.1
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
BenzyI Butyl Phthalate	20	1	--	--
Bis(2-Ethylhexyl) Phthalate	20	3	--	--
Dibenzofuran	20	20	95% Adjusted Gamma UCL	4.72
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Methylcyclohexane	9	3	--	--
Central Landfills Area				
TAL Metals (mg/kg)				
Aluminum	55	55	95% Student's-t UCL	14,442
Antimony	55	4	95% KM (t) UCL	0.2037
Arsenic	55	55	95% Approximate Gamma UCL	6.80
Barium	55	55	95% Approximate Gamma UCL	144.3
Beryllium	55	55	95% Student's-t UCL	0.7325
Cadmium	55	5	95% KM (t) UCL	0.2101
Chromium, Hexavalent	59	55	95% KM (t) UCL	0.2912
Chromium, Total	59	59	95% Student's-t UCL	11.25
Cobalt	55	55	95% Approximate Gamma UCL	6.12
Copper	55	55	95% Chebyshev (Mean, Sd) UCL	192.9
Lead	55	55	95% Student's-t UCL	14.23
Manganese	55	55	95% Student's-t UCL	482.6
Nickel	55	55	95% Chebyshev (Mean, Sd) UCL	60.08
Selenium	55	13	95% KM Chebyshev UCL	0.4523
Thallium	55	13	95% KM (Chebyshev) UCL	0.1731
Vanadium	55	55	95% Chebyshev (Mean, Sd) UCL	25.29
Zinc	55	55	95% Student's-t UCL	51.81
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	55	44	95% KM (Chebyshev) UCL	1.41
Fluoride	55	55	95% Chebyshev(Mean, Sd) UCL	118.5
Dioxins and Furans (mg/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2	2	--	--
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	2	2	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	2	2	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran	2	2	--	--
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	2	2	--	--
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	2	2	--	--
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	2	1	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran	2	1	--	--
2,3,4,7,8-Pentachlorodibenzofuran	2	2	--	--
2,3,7,8-Tetrachlorodibenzofuran	2	2	--	--
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	2	1	--	--
Octachlorodibenzofuran	2	2	--	--

Table I-3
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Depth-Weighted Soil Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Octachlorodibenzo-P-Dioxin	2	2	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1254 (Aroclor 1254)	35	4	95% KM (t) UCL	0.1029
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	55	45	95% KM (Chebyshev) UCL	2.62
Anthracene	55	46	95% KM (Chebyshev) UCL	4.73
Benzo(A)Anthracene	55	55	95% Chebyshev (Mean, Sd) UCL	9.59
Benzo(A)Pyrene	55	55	95% Chebyshev (Mean, Sd) UCL	8.52
Benzo(B)Fluoranthene	55	55	95% Chebyshev (Mean, Sd) UCL	11.76
Benzo(G,H,I)Perylene	55	55	95% Chebyshev(Mean, Sd) UCL	5.89
Chrysene	55	55	95% Chebyshev (Mean, Sd) UCL	12.78
Dibenz(A,H)Anthracene	55	53	95% KM Chebyshev UCL	2.13
Fluoranthene	55	55	95% Chebyshev (Mean, Sd) UCL	24.33
Fluorene	55	46	95% KM (Chebyshev) UCL	2.32
Indeno(1,2,3-C,D)Pyrene	55	55	95% Chebyshev (Mean, Sd) UCL	6.73
Naphthalene	55	35	95% KM (Chebyshev) UCL	0.8567
Phenanthrene	55	55	95% Chebyshev (Mean, Sd) UCL	22.24
Pyrene	55	55	95% Chebyshev (Mean, Sd) UCL	13.93
Total HMW PAHs - 1/2MDL	55	55	95% Chebyshev (Mean, Sd) UCL	75.39
Total HMW PAHs - MDL	55	55	95% Chebyshev (Mean, Sd) UCL	75.40
Total HMW PAHs - Zero	55	55	95% Chebyshev (Mean, Sd) UCL	75.38
Total LMW PAHs - 1/2MDL	55	55	95% Chebyshev (Mean, Sd) UCL	57.47
Total LMW PAHs - MDL	55	55	95% Chebyshev (Mean, Sd) UCL	57.49
Total LMW PAHs - Zero	55	55	95% Chebyshev (Mean, Sd) UCL	57.45
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Benzyl Butyl Phthalate	55	5	95% KM Approximate Gamma UCL	0.0398
Bis(2-Ethylhexyl) Phthalate	55	12	95% KM (Chebyshev) UCL	0.0786
Dibenzofuran	55	37	95% KM (Chebyshev) UCL	1.36
Di-N-Butyl Phthalate	55	5	95% KM (t) UCL	0.0084
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Methylcyclohexane	27	5	95% KM (t) UCL	3.52E-04
Industrial Landfill Area				
TAL Metals (mg/kg)				
Aluminum	6	6	95% Student's-t UCL	58,372
Antimony	6	4	95% KM Bootstrap t UCL	--
Arsenic	6	6	95% Chebyshev (Mean, Sd) UCL	21.45
Barium	6	6	95% Student's-t UCL	183.1
Beryllium	6	6	95% Chebyshev(Mean, Sd) UCL	6.93
Cadmium	6	3	--	--
Chromium, Hexavalent	6	6	95% Adjusted Gamma UCL	0.6063
Chromium, Total	6	6	95% Adjusted Gamma UCL	22.65
Cobalt	6	6	95% Student's-t UCL	10.89
Copper	6	6	95% Chebyshev(Mean, Sd) UCL	533.7
Lead	6	6	95% Student's-t UCL	15.85
Manganese	6	6	95% Student's-t UCL	487.3
Nickel	6	6	95% Chebyshev(Mean, Sd) UCL	452.0
Selenium	6	3	--	--
Thallium	6	2	--	--
Vanadium	6	6	95% Chebyshev(Mean, Sd) UCL	150.6
Zinc	6	6	95% Student's-t UCL	56.49
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	6	3	--	--
Fluoride	6	6	90% Chebyshev(Mean, Sd) UCL	513.2
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Acenaphthene	6	6	95% Student's-t UCL	1.06
Benzo(A)Anthracene	6	6	95% Student's-t UCL	11.09
Benzo(A)Pyrene	6	6	95% Student's-t UCL	13.97
Benzo(B)Fluoranthene	6	6	95% Student's-t UCL	15.49
Benzo(G,H,I)Perylene	6	6	95% Student's-t UCL	13.65
Chrysene	6	6	95% Student's-t UCL	12.77
Fluoranthene	6	6	95% Student's-t UCL	16.38
Naphthalene	6	6	95% Chebyshev(Mean, Sd) UCL	0.5038
Phenanthrene	6	6	95% Student's-t UCL	7.86

Table I-3
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Depth-Weighted Soil Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Pyrene	6	6	95% Student's-t UCL	16.15
Total HMW PAHs - 1/2MDL	6	6	95% Student's-t UCL	103.4
Total HMW PAHs - MDL	6	6	95% Student's-t UCL	103.4
Total HMW PAHs - Zero	6	6	95% Student's-t UCL	103.4
Total LMW PAHs - 1/2MDL	6	6	95% Student's-t UCL	27.47
Total LMW PAHs - MDL	6	6	95% Student's-t UCL	27.49
Total LMW PAHs - Zero	6	6	95% Student's-t UCL	27.45
Eastern Undeveloped Area				
TAL Metals (mg/kg)				
Aluminum	22	22	95% Student's-t UCL	18,531
Arsenic	22	22	95% Student's-t UCL	5.61
Barium	22	22	95% Student's-t UCL	380.5
Cadmium	22	6	95% KM (t) UCL	0.1947
Chromium, Hexavalent	22	22	95% Student's-t UCL	0.2502
Cobalt	22	22	95% Student's-t UCL	4.99
Copper	22	22	95% Student's-t UCL	12.15
Lead	22	22	95% Student's-t UCL	12.65
Manganese	22	22	95% Adjusted Gamma UCL	820.6
Mercury	22	21	95% KM Adjusted Gamma UCL	0.0287
Nickel	22	22	95% Student's-t UCL	16.24
Selenium	22	1	--	--
Thallium	22	5	95% KM (t) UCL	0.0724
Vanadium	22	22	95% Student's-t UCL	12.89
Zinc	22	22	95% Student's-t UCL	60.52
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	22	17	95% KM Adjusted Gamma UCL	0.1737
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Benzo(A)Anthracene	22	20	Gamma Adjusted KM-UCL	0.1957
Benzo(A)Pyrene	22	22	95% Adjusted Gamma UCL	0.3075
Total HMW PAHs - 1/2MDL	22	22	95% Adjusted Gamma UCL	3.34
Total HMW PAHs - MDL	22	22	95% Adjusted Gamma UCL	3.33
Total HMW PAHs - Zero	22	22	95% Adjusted Gamma UCL	3.35
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Bis(2-Ethylhexyl) Phthalate	22	7	95% KM (t) UCL	0.0625
Di-N-Butyl Phthalate	22	1	--	--
North-Central Undeveloped Area				
TAL Metals (mg/kg)				
Aluminum	27	27	95% Adjusted Gamma UCL	16,317
Arsenic	27	27	95% Student's-t UCL	6.86
Barium	27	27	95% Student's-t UCL	218.9
Cadmium	27	2	--	--
Chromium, Hexavalent	27	27	95% Student's-t UCL	0.2764
Cobalt	27	27	95% Student's-t UCL	5.91
Copper	27	27	95% Student's-t UCL	14.69
Lead	27	27	95% Student's-t UCL	12.23
Manganese	27	27	95% Student's-t UCL	580.9
Nickel	27	27	95% Adjusted Gamma UCL	12.49
Selenium	27	4	95% KM (t) UCL	0.1925
Thallium	27	3	--	--
Vanadium	27	27	95% Student's-t UCL	12.24
Zinc	27	27	95% Student's-t UCL	56.52
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	27	16	95% KM Adjusted Gamma UCL	0.1031
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Total HMW PAHs - 1/2MDL	27	27	95% Student's-t UCL	0.4080
Total HMW PAHs - MDL	27	27	95% Adjusted Gamma UCL	0.4502
Total HMW PAHs - Zero	27	27	95% Adjusted Gamma UCL	0.4446
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Bis(2-Ethylhexyl) Phthalate	27	13	95% KM Chebyshev UCL	0.1616
Western Undeveloped Area				
TAL Metals (mg/kg)				
Aluminum	41	41	95% Student's-t UCL	18,204
Antimony	41	1	--	--

Table I-3
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Depth-Weighted Soil Results by Ecological Exposure Area

Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Arsenic	41	41	95% Adjusted Gamma UCL	5.94
Barium	41	41	95% Student's-t UCL	259.9
Beryllium	41	41	95% Student's-t UCL	0.6831
Cadmium	41	3	--	--
Chromium, Hexavalent	41	41	95% Student's-t UCL	0.3143
Cobalt	41	41	95% Student's-t UCL	5.91
Copper	41	41	95% Adjusted Gamma UCL	16.69
Lead	41	41	95% Student's-t UCL	12.63
Manganese	41	41	95% Student's-t UCL	429.5
Nickel	41	41	95% Student's-t UCL	11.29
Selenium	41	16	95% KM Adjusted Gamma UCL	0.3215
Thallium	41	3	--	--
Vanadium	41	41	95% Student's-t UCL	12.71
Zinc	41	41	95% Adjusted Gamma UCL	52.76
Other Inorganic Parameters (mg/kg unless otherwise noted)				
Cyanide	41	35	95% KM Adjusted Gamma UCL	0.1311
Dioxins and Furans (mg/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzofuran	10	4	95% KM (t) UCL	3.45E-07
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	10	10	95% Student's-t UCL	1.83E-06
1,2,3,4,7,8-Hexachlorodibenzofuran	10	3	--	--
1,2,3,4,7,8-Hexachlorodibenzo-P-Dioxin	10	1	--	--
1,2,3,6,7,8-Hexachlorodibenzofuran	10	7	95% KM Adjusted Gamma UCL	2.37E-07
1,2,3,6,7,8-Hexachlorodibenzo-P-Dioxin	10	3	--	--
1,2,3,7,8,9-Hexachlorodibenzo-P-Dioxin	10	5	95% KM (t) UCL	2.39E-07
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin	10	6	95% KM (t) UCL	8.70E-08
2,3,4,6,7,8-Hexachlorodibenzofuran	10	3	--	--
2,3,4,7,8-Pentachlorodibenzofuran	10	2	--	--
2,3,7,8-Tetrachlorodibenzo-P-Dioxin	10	3	--	--
Octachlorodibenzofuran	10	6	95% KM (t) UCL	1.32E-06
Octachlorodibenzo-P-Dioxin	10	10	95% Student's-t UCL	1.36E-05
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
Total HMW PAHs - 1/2MDL	41	36	Gamma Adjusted KM-UCL	0.2520
Total HMW PAHs - MDL	41	36	Gamma Adjusted KM-UCL	0.2606
Total HMW PAHs - Zero	41	36	Gamma Adjusted KM-UCL	0.2443
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
Bis(2-Ethylhexyl) Phthalate	41	10	95% KM (t) UCL	0.0429
Di-N-Butyl Phthalate	41	4	95% KM (Chebyshev) UCL	0.0578
TCL Volatile Organic Compounds (TCL VOCs) (mg/kg)				
Methylcyclohexane	16	1	--	--
Aluminum	19	19	95% Student's-t UCL	9.062
Arsenic	19	19	95% Student's-t UCL	4.88
Barium	19	19	95% Student's-t UCL	141.2
Cobalt	19	19	95% Student's-t UCL	6.08
Copper	19	19	95% Student's-t UCL	15.90
Lead	19	19	95% Student's-t UCL	9.42
Manganese	19	19	95% Student's-t UCL	312.1
Nickel	19	19	95% Student's-t UCL	12.79
Selenium	19	1	--	--
Vanadium	19	19	95% Student's-t UCL	14.62
Zinc	19	19	95% Student's-t UCL	42.98
Cyanide	19	13	Gamma Adjusted KM-UCL	1.24
Naphthalene	19	3	--	--
Total HMW PAHs - 1/2MDL	19	17	95% KM (t) UCL	0.5181
Total HMW PAHs - MDL	19	17	95% KM (t) UCL	0.5402
Total HMW PAHs - Zero	19	17	95% KM Adjusted Gamma UCL	0.5728
Di-N-Butyl Phthalate	19	3	--	--
Methylcyclohexane	19	19	95% Student's-t UCL	0.0053

Notes:

--: Not enough detected observations to estimate the UCL
mg/kg: milligram per kilogram
TAL: Target Analyte List
TCL: Target Compound List
UCL: Upper Confidence Limit of the Mean

Table I-4
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Surface Water Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Fraction	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Cedar Creek Area					
TAL Metals (µg/L)					
Barium	U	28	28	95% Student's-t UCL	108.2
Barium	F	16	16	95% Student's-t UCL	104.6
Chromium, Total	U	28	2	--	--
Chromium, Total	F	16	0	--	--
Copper	U	28	9	95% KM (t) UCL	2.97
Copper	F	16	0	--	--
Iron	U	28	3	--	--
Iron	F	16	0	--	--
Zinc	U	28	2	--	--
Zinc	F	16	1	--	--
Other Inorganic Parameters (µg/L unless otherwise noted)					
Cyanide	U	32	7	95% KM (Chebyshev) UCL	5.01
Cyanide	F	4	0	--	--
Cyanide (Free)	U	20	2	--	--
Cyanide (Free)	F	2	0	--	--
Fluoride	U	28	22	95% KM (t) UCL	107.5
Fluoride	F	4	4	95% Adjusted-CLT UCL (Chen-1995)	129.4
Cedar Creek Reservoir Overflow Ditch Area					
TAL Metals (µg/L)					
Aluminum	U	27	20	95% KM (Chebyshev) UCL	369.2
Aluminum	F	16	1	--	--
Barium	U	27	27	95% Student's-t UCL	101.4
Barium	F	16	16	95% Student's-t UCL	106.5
Copper	U	27	9	95% KM (t) UCL	2.71
Copper	F	16	0	--	--
Iron	U	27	5	Gamma Adjusted KM-UCL	688.2
Iron	F	16	0	--	--
Manganese	U	27	26	95% KM (Chebyshev) UCL	749.3
Manganese	F	16	3	--	--
Vanadium	U	27	6	95% KM (t) UCL	1.52
Vanadium	F	16	0	--	--
Other Inorganic Parameters (µg/L unless otherwise noted)					
Cyanide (Free)	U	11	3	--	--
Fluoride	U	27	27	95% Chebyshev (Mean, Sd) UCL	627.3
Fluoride	F	5	5	95% Student's-t UCL	177.0
South Percolation Pond Area					
TAL Metals (µg/L)					
Aluminum	U	26	22	Gamma Adjusted KM-UCL	6,018
Aluminum	F	17	9	Gamma Adjusted KM-UCL	907.1
Barium	U	26	26	95% Chebyshev (Mean, Sd) UCL	788.0
Barium	F	17	17	95% Adjusted Gamma UCL	313.5
Beryllium	U	26	1	--	--
Beryllium	F	17	0	--	--
Cadmium	U	26	2	--	--
Cadmium	F	17	0	--	--
Chromium, Total	U	26	9	Gamma Adjusted KM-UCL	5.96
Chromium, Total	F	17	1	--	--
Cobalt	U	26	3	--	--
Cobalt	F	17	0	--	--
Copper	U	26	19	95% KM Chebyshev UCL	46.91
Copper	F	17	7	95% KM Chebyshev UCL	12.67
Iron	U	26	23	95% KM (Chebyshev) UCL	5,192
Iron	F	17	10	95% KM (Chebyshev) UCL	640.1
Manganese	U	26	23	95% KM Chebyshev UCL	88.74
Manganese	F	17	11	95% KM (Chebyshev) UCL	88.74
Mercury	U	26	1	--	--
Mercury	F	17	0	--	--
Selenium	U	26	3	--	--
Selenium	F	17	0	--	--
Vanadium	U	26	8	95% KM (Chebyshev) UCL	6.61
Vanadium	F	17	1	--	--

Table I-4
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Surface Water Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Fraction	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Zinc	U	26	11	Gamma Adjusted KM-UCL	42.43
Zinc	F	17	3	--	--
Other Inorganic Parameters (µg/L unless otherwise noted)					
Cyanide	U	26	15	95% KM (Chebyshev) UCL	42.84
Cyanide	F	5	3	--	--
Cyanide (Free)	U	16	13	95% KM Adjusted Gamma UCL	5.62
Cyanide (Free)	F	3	3	--	--
Fluoride	U	26	26	95% Chebyshev (Mean, Sd) UCL	2,620
Fluoride	F	3	3	--	--
Nitrogen, Ammonia (As N)	U	26	17	95% KM (Chebyshev) UCL	1,943
Essential Nutrients (µg/L)					
Calcium	U	26	26	95% Chebyshev (Mean, Sd) UCL	153,653
Calcium	F	17	17	95% Student's-t UCL	61,093
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)					
Benzo(A)Pyrene	U	5	1	--	--
Benzo(B)Fluoranthene	U	5	1	--	--
Indeno(1,2,3-C,D)Pyrene	U	5	1	--	--
Northern Surface Water Feature					
TAL Metals (µg/L)					
Aluminum	U	16	15	97.5% KM (Chebyshev) UCL	2,713
Aluminum	F	11	0	--	--
Barium	U	16	16	95% Student's-t UCL	146.5
Barium	F	11	11	95% Student's-t UCL	147.2
Copper	U	16	2	--	--
Copper	F	11	0	--	--
Iron	U	16	8	95% KM (Chebyshev) UCL	1,696
Iron	F	11	0	--	--
Manganese	U	16	13	Gamma Adjusted KM-UCL	52.08
Manganese	F	11	8	95% KM Chebyshev UCL	45.47
Selenium	U	16	1	--	--
Selenium	F	11	1	--	--
Vanadium	U	16	3	--	--
Vanadium	F	11	0	--	--
Other Inorganic Parameters (µg/L unless otherwise noted)					
Fluoride	U	16	16	95% Student's-t UCL	227.8
Fluoride	F	1	1	--	--
Flathead River Riparian Area					
TAL Metals (µg/L)					
Aluminum	U	15	15	99% Chebyshev (Mean, Sd) UCL	25,297
Aluminum	F	15	11	95% KM (t) UCL	291.8
Arsenic	U	15	10	95% KM Adjusted Gamma UCL	7.81
Arsenic	F	15	9	95% KM (t) UCL	2.69
Barium	U	15	15	95% Chebyshev(Mean, Sd) UCL	627.2
Barium	F	15	15	95% Student's-t UCL	267.4
Beryllium	U	15	3	--	--
Beryllium	F	15	0	--	--
Cadmium	U	15	1	--	--
Cadmium	F	15	0	--	--
Chromium, Total	U	15	4	95% KM (t) UCL	9.45
Chromium, Total	F	15	0	--	--
Cobalt	U	15	10	95% KM (Chebyshev) UCL	10.04
Cobalt	F	15	6	95% KM (t) UCL	1.44
Copper	U	15	12	95% KM (Chebyshev) UCL	29.78
Copper	F	15	3	--	--
Iron	U	15	15	95% Adjusted Gamma UCL	17,093
Iron	F	15	15	99% Chebyshev (Mean, Sd) UCL	8,108
Lead	U	15	11	975% KM (Chebyshev) UCL	20.60
Lead	F	15	6	95% KM (t) UCL	0.5996
Manganese	U	15	15	95% Adjusted Gamma UCL	1,404
Manganese	F	15	15	95% Adjusted Gamma UCL	1,121
Mercury	U	15	1	--	--
Mercury	F	15	0	--	--
Vanadium	U	15	4	95% KM (t) UCL	11.96

Table I-4
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Surface Water Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Fraction	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Vanadium	F	15	0	--	--
Zinc	U	15	6	95% KM (t) UCL	49.72
Zinc	F	15	2	--	--
Other Inorganic Parameters (µg/L unless otherwise noted)					
Cyanide	U	15	15	95% Adjusted Gamma UCL	334.9
Cyanide	F	5	5	95% Student's-t UCL	183.9
Cyanide (Free)	U	15	14	Gamma Adjusted KM-UCL	61.45
Cyanide (Free)	F	5	5	95% Student's-t UCL	44.85
Fluoride	U	15	15	95% Adjusted Gamma UCL	2,661
Essential Nutrients (µg/L)					
Calcium	U	15	15	95% Student's-t UCL	92,086
Calcium	F	15	15	95% Student's-t UCL	62,659
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)					
Benzo(A)Anthracene	U	6	1	--	--
Benzo(A)Pyrene	U	6	1	--	--
Benzo(B)Fluoranthene	U	6	1	--	--
Benzo(G,H,I)Perylene	U	6	1	--	--
Benzo(K)Fluoranthene	U	6	1	--	--
Chrysene	U	6	1	--	--
Dibenz(A,H)Anthracene	U	6	1	--	--
Fluoranthene	U	6	6	95% Student's-t UCL	2.64
Indeno(1,2,3-C,D)Pyrene	U	6	1	--	--
Phenanthrene	U	6	3	--	--
Pyrene	U	6	3	--	--
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (µg/L)					
3- And 4- Methylphenol (Total)	U	5	1	--	--
Benzaldehyde	U	6	1	--	--
Caprolactam	U	6	1	--	--
Carbazole	U	6	2	--	--
Phenol	U	6	2	--	--
TCL Volatile Organic Compounds (TCL VOCs) (µg/L)					
Toluene	U	5	2	--	--
Flathead River Area					
TAL Metals (µg/L)					
Aluminum	U	76	70	95% KM (Chebyshev) UCL	486.2
Aluminum	F	49	12	95% KM (t) UCL	22.27
Barium	U	76	76	95% Student's-t UCL	116.8
Barium	F	49	49	95% Student's-t UCL	103.6
Copper	U	76	21	95% KM Chebyshev UCL	3.25
Copper	F	49	2	--	--
Iron	U	76	51	95% KM Approximate Gamma UCL	477.5
Iron	F	49	11	95% KM (t) UCL	62.64
Manganese	U	76	54	95% KM Approximate Gamma UCL	28.43
Manganese	F	49	29	95% KM (Chebyshev) UCL	20.47
Nickel	U	76	4	95% KM (t) UCL	1.35
Nickel	F	49	2	--	--
Vanadium	U	76	4	95% KM (t) UCL	1.24
Vanadium	F	49	0	--	--
Other Inorganic Parameters (µg/L unless otherwise noted)					
Cyanide	U	76	28	95% KM Chebyshev UCL	85.04
Cyanide	F	15	9	Gamma Adjusted KM-UCL	182.8
Cyanide (Free)	U	48	26	95% KM Chebyshev UCL	26.80
Cyanide (Free)	F	10	10	95% Adjusted Gamma UCL	23.20
Fluoride	U	76	65	95% KM (Chebyshev) UCL	742.1
Fluoride	F	9	9	95% Chebyshev (Mean, Sd) UCL	388.9
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/L)					
Benzo(A)Anthracene	U	11	3	--	--
Benzo(A)Pyrene	U	11	2	--	--
Benzo(B)Fluoranthene	U	11	3	--	--
Benzo(G,H,I)Perylene	U	11	1	--	--
Benzo(K)Fluoranthene	U	11	2	--	--
Chrysene	U	11	4	95% KM (t) UCL	0.3657
Dibenz(A,H)Anthracene	U	11	1	--	--

Table I-4
Upper Confidence Limit of the Mean Concentrations (UCL_{mean}) for Surface Water Results by Ecological Exposure Area
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Constituent	Fraction	Number of Samples	Number of Detections	Upper Confidence Limit (UCL) Method	UCL Value
Fluoranthene	U	11	4	95% KM Bootstrap t UCL	--
Indeno(1,2,3-C,D)Pyrene	U	11	1	--	--
Phenanthrene	U	11	2	--	--
Pyrene	U	11	4	95% KM Bootstrap t UCL	--
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (µg/L)					
Bis(2-Ethylhexyl) Phthalate	U	11	4	95% KM (t) UCL	7.71
Caprolactam	U	11	4	95% KM (t) UCL	0.9475

Notes:

--: Not enough detected observations to estimate the UCL

F: Filtered

TAL: Target Analyte List

TCL: Target Compound List

µg/L: microgram per liter

U: Unfiltered

UCL: Upper Confidence Limit of the Mean



Appendix J Incremental Soil Sampling Exposure Point Concentrations



Appendix J1 Calculation of Exposure Point Concentrations in the Operational Area Based on Incremental Soil Sampling (ISS) Data

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-011-SO-0.0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	15,100	18,100	16,200	Student's-t 95% UCL	19,025
Antimony	0.16	0.25	0.18	Chebychev 95% UCL	0.32
Arsenic	4.30	4.50	4.90	Student's-t 95% UCL	5.08
Barium	76.7	81.1	81.7	Student's-t 95% UCL	84.4
Beryllium	0.52	0.56	0.54	Student's-t 95% UCL	0.57
Cadmium	0.30	0.25	0.22	Student's-t 95% UCL	0.32
Chromium, Hexavalent	0.50	0.40	0.66	Chebychev 95% UCL	0.85
Chromium, Total	18.5	14.8	24.5	Chebychev 95% UCL	31.6
Chromium, Trivalent	18.0	14.4	23.8	Chebychev 95% UCL	30.7
Cobalt	5.60	5.80	5.80	Student's-t 95% UCL	5.93
Copper	21.1	29.9	22.3	Student's-t 95% UCL	32.5
Iron	14,900	15,200	14,900	Student's-t 95% UCL	15,292
Lead	40.7	19.4	15.2	Chebychev 95% UCL	59.5
Manganese	385.0	379.0	359.0	Student's-t 95% UCL	397.3
Mercury	0.010	0.019	0.020	Chebychev 95% UCL	0.031
Nickel	28.2	32.1	30.4	Student's-t 95% UCL	33.5
Selenium	0.22	0.21	0.27	Student's-t 95% UCL	0.29
Silver	0.041	0.060	0.052	Student's-t 95% UCL	0.067
Thallium	0.067	0.070	0.067	Student's-t 95% UCL	0.071
Vanadium	14.4	15.8	16.0	Student's-t 95% UCL	16.9
Zinc	70.7	93.1	68.1	Student's-t 95% UCL	100.5
Other Inorganic Parameters (mg/kg)					
Cyanide	0.17	0.15	0.14	Student's-t 95% UCL	0.18
Fluoride	45.7	34.1	32.9	Student's-t 95% UCL	49.5

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-011-SO-0.0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	25,400	23,200	24,100	Student's-t 95% UCL	26,098
Magnesium	10,900	10,500	10,600	Student's-t 95% UCL	11,018
Potassium	1,060	1,060	1,080	Student's-t 95% UCL	1,086
Sodium	90.8	128.0	120.0	Student's-t 95% UCL	145.9
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	0.005	0.059	0.005	Chebychev 95% UCL	0.10
Polychlorinated Biphenyl (PCBs)	0.005	0.059	0.005	Chebychev 95% UCL	0.10
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.057	0.062	0.057	Student's-t 95% UCL	0.064
2-Methylnaphthalene	--	--	--	--	--
Acenaphthene	0.17	0.30	0.19	Chebychev 95% UCL	0.40
Acenaphthylene	--	--	--	--	--
Anthracene	0.39	0.57	0.38	Chebychev 95% UCL	0.72
Benzo(A)Anthracene	2.20	4.40	2.20	Chebychev 95% UCL	6.13
Benzo(A)Pyrene	2.70	5.20	2.60	Chebychev 95% UCL	7.21
Benzo(B)Fluoranthene	3.30	6.00	3.40	Chebychev 95% UCL	8.09
Benzo(G,H,I)Perylene	3.30	5.60	3.40	Chebychev 95% UCL	7.37
Benzo(K)Fluoranthene	1.30	3.00	1.40	Chebychev 95% UCL	4.30
Chrysene	3.30	6.00	3.30	Chebychev 95% UCL	8.12
Dibenz(A,H)Anthracene	0.62	1.40	0.75	Chebychev 95% UCL	1.98
Fluoranthene	4.00	6.10	3.70	Chebychev 95% UCL	7.89
Fluorene	0.11	0.13	0.13	Student's-t 95% UCL	0.14
Indeno(1,2,3-C,D)Pyrene	2.40	4.50	2.50	Chebychev 95% UCL	6.11
Phenanthrene	2.10	2.60	1.90	Student's-t 95% UCL	2.81

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-011-SO-0.0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	4.30	6.90	4.00	Chebychev 95% UCL	9.08
Total HMW PAHs - 1/2MDL	23.4	43.0	23.6	Chebychev 95% UCL	58.3
Total HMW PAHs - MDL	23.4	43.0	23.6	Chebychev 95% UCL	58.3
Total HMW PAHs - Zero	23.4	43.0	23.6	Chebychev 95% UCL	58.3
Total LMW PAHs - 1/2MDL	6.86	9.80	6.39	Chebychev 95% UCL	12.3
Total LMW PAHs - MDL	6.90	9.84	6.43	Chebychev 95% UCL	12.4
Total LMW PAHs - Zero	6.83	9.76	6.36	Chebychev 95% UCL	12.3
Total PAHs - 1/2MDL	27.0	46.8	26.5	Chebychev 95% UCL	62.5
Total PAHs - MDL	27.0	46.8	26.5	Chebychev 95% UCL	62.6
Total PAHs - Zero	26.9	46.8	26.5	Chebychev 95% UCL	62.5
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	--	--	--	--	--
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	--	--	--	--	--
Carbazole	0.49	0.68	0.49	Student's-t 95% UCL	0.74
Dibenzofuran	0.055	0.075	0.067	Student's-t 95% UCL	0.083
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-011-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	12,400	12,900	12,700	Student's-t 95% UCL	13,091
Antimony	--	--	--	--	--
Arsenic	4.40	4.30	4.20	Student's-t 95% UCL	4.47
Barium	104.0	117.0	102.0	Student's-t 95% UCL	121.4
Beryllium	0.48	0.49	0.49	Student's-t 95% UCL	0.50
Cadmium	0.095	0.094	0.083	Student's-t 95% UCL	0.10
Chromium, Hexavalent	0.39	0.38	0.40	Student's-t 95% UCL	0.40
Chromium, Total	14.6	14.2	14.8	Student's-t 95% UCL	15.0
Chromium, Trivalent	14.2	13.8	14.4	Student's-t 95% UCL	14.6
Cobalt	5.70	5.80	5.80	Student's-t 95% UCL	5.86
Copper	16.1	17.6	16.1	Student's-t 95% UCL	18.1
Iron	15,800	16,900	15,900	Student's-t 95% UCL	17,225
Lead	11.3	10.8	10.2	Student's-t 95% UCL	11.7
Manganese	459.0	480.0	437.0	Student's-t 95% UCL	494.9
Mercury	0.023	0.021	0.010	Chebychev 95% UCL	0.036
Nickel	12.3	13.4	13.7	Student's-t 95% UCL	14.4
Selenium	0.22	0.23	0.18	Student's-t 95% UCL	0.25
Silver	0.045	0.039	0.040	Student's-t 95% UCL	0.047
Thallium	0.064	0.073	0.067	Student's-t 95% UCL	0.076
Vanadium	11.3	11.4	11.5	Student's-t 95% UCL	11.6
Zinc	62.1	60.4	73.0	Student's-t 95% UCL	76.7
Other Inorganic Parameters (mg/kg)					
Cyanide	0.032	0.080	0.065	Chebychev 95% UCL	0.12
Fluoride	30.6	20.4	31.2	Student's-t 95% UCL	37.6

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-011-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	23,800	21,200	23,200	Student's-t 95% UCL	25,028
Magnesium	10,900	10,500	11,200	Student's-t 95% UCL	11,459
Potassium	1,030	1,020	978.0	Student's-t 95% UCL	1,056
Sodium	--	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	1.30	0.72	0.97	Chebychev 95% UCL	1.73
Polychlorinated Biphenyl (PCBs)	1.30	0.72	0.97	Chebychev 95% UCL	1.73
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.015	0.011	0.010	Chebychev 95% UCL	0.019
2-Methylnaphthalene	0.015	0.006	0.007	Chebychev 95% UCL	0.022
Acenaphthene	0.13	0.027	0.040	Chebychev 95% UCL	0.21
Acenaphthylene	0.004	0.002	0.003	Chebychev 95% UCL	0.005
Anthracene	0.25	0.053	0.077	Chebychev 95% UCL	0.40
Benzo(A)Anthracene	0.58	0.24	0.33	Chebychev 95% UCL	0.83
Benzo(A)Pyrene	0.53	0.27	0.36	Chebychev 95% UCL	0.72
Benzo(B)Fluoranthene	0.64	0.34	0.46	Chebychev 95% UCL	0.86
Benzo(G,H,I)Perylene	0.39	0.28	0.36	Student's-t 95% UCL	0.44
Benzo(K)Fluoranthene	0.26	0.15	0.18	Chebychev 95% UCL	0.34
Chrysene	0.65	0.32	0.46	Chebychev 95% UCL	0.89
Dibenz(A,H)Anthracene	0.11	0.065	0.080	Chebychev 95% UCL	0.14
Fluoranthene	1.10	0.39	0.64	Chebychev 95% UCL	1.62
Fluorene	0.068	0.020	0.029	Chebychev 95% UCL	0.10
Indeno(1,2,3-C,D)Pyrene	0.35	0.21	0.27	Chebychev 95% UCL	0.45
Phenanthrene	1.10	0.26	0.41	Chebychev 95% UCL	1.72

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-011-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	1.10	0.41	0.63	Chebychev 95% UCL	1.60
Total HMW PAHs - 1/2MDL	4.61	2.29	3.13	Chebychev 95% UCL	6.30
Total HMW PAHs - MDL	4.61	2.29	3.13	Chebychev 95% UCL	6.30
Total HMW PAHs - Zero	4.61	2.29	3.13	Chebychev 95% UCL	6.30
Total LMW PAHs - 1/2MDL	2.68	0.77	1.22	Chebychev 95% UCL	4.07
Total LMW PAHs - MDL	2.69	0.77	1.22	Chebychev 95% UCL	4.08
Total LMW PAHs - Zero	2.68	0.77	1.22	Chebychev 95% UCL	4.07
Total PAHs - 1/2MDL	6.64	2.71	3.88	Chebychev 95% UCL	9.48
Total PAHs - MDL	6.64	2.71	3.88	Chebychev 95% UCL	9.49
Total PAHs - Zero	6.63	2.71	3.88	Chebychev 95% UCL	9.48
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	0.005	0.003	0.004	Chebychev 95% UCL	0.006
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	--	--	--	--	--
Carbazole	0.17	0.044	0.073	Chebychev 95% UCL	0.26
Dibenzofuran	0.051	0.013	0.016	Chebychev 95% UCL	0.080
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-015-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	17,600	20,200	16,400	Student's-t 95% UCL	21,341
Antimony	0.085	0.18	0.090	Chebychev 95% UCL	0.25
Arsenic	5.10	5.50	5.50	Student's-t 95% UCL	5.76
Barium	106.0	132.0	105.0	Student's-t 95% UCL	140.1
Beryllium	0.68	0.76	0.65	Student's-t 95% UCL	0.79
Cadmium	0.071	0.075	0.073	Student's-t 95% UCL	0.076
Chromium, Hexavalent	0.40	0.52	0.64	Chebychev 95% UCL	0.82
Chromium, Total	14.8	19.6	23.8	Chebychev 95% UCL	30.7
Chromium, Trivalent	14.4	19.1	23.2	Chebychev 95% UCL	29.9
Cobalt	5.80	6.10	6.10	Student's-t 95% UCL	6.29
Copper	15.2	15.9	15.8	Student's-t 95% UCL	16.3
Iron	15,400	16,200	16,100	Student's-t 95% UCL	16,635
Lead	10.4	9.70	10.6	Student's-t 95% UCL	11.0
Manganese	430.0	528.0	452.0	Student's-t 95% UCL	556.7
Mercury	0.021	0.027	0.024	Student's-t 95% UCL	0.029
Nickel	13.2	16.2	17.3	Student's-t 95% UCL	19.1
Selenium	0.20	0.26	0.17	Student's-t 95% UCL	0.29
Silver	0.038	0.039	0.031	Student's-t 95% UCL	0.043
Thallium	0.091	0.11	0.089	Student's-t 95% UCL	0.12
Vanadium	12.5	14.4	13.4	Student's-t 95% UCL	15.0
Zinc	46.7	49.8	48.5	Student's-t 95% UCL	51.0
Other Inorganic Parameters (mg/kg)					
Cyanide	1.30	1.30	0.85	Chebychev 95% UCL	1.80
Fluoride	597.0	531.0	392.0	Student's-t 95% UCL	683.1

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-015-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	28,200	26,800	21,100	Student's-t 95% UCL	31,707
Magnesium	11,200	11,600	11,300	Student's-t 95% UCL	11,718
Potassium	1,560	2,250	1,810	Student's-t 95% UCL	2,462
Sodium	1,810	2,520	1,310	Chebychev 95% UCL	3,410
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	--	--	--	--	--
Polychlorinated Biphenyl (PCBs)	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.003	0.004	0.003	Chebychev 95% UCL	0.005
2-Methylnaphthalene	0.003	0.003	0.002	Student's-t 95% UCL	0.003
Acenaphthene	0.014	0.005	0.005	Chebychev 95% UCL	0.021
Acenaphthylene	0.002	0.002	0.002	Student's-t 95% UCL	0.002
Anthracene	0.036	0.015	0.013	Chebychev 95% UCL	0.053
Benzo(A)Anthracene	0.11	0.086	0.059	Chebychev 95% UCL	0.15
Benzo(A)Pyrene	0.10	0.072	0.050	Chebychev 95% UCL	0.14
Benzo(B)Fluoranthene	0.19	0.21	0.15	Student's-t 95% UCL	0.23
Benzo(G,H,I)Perylene	0.11	0.11	0.073	Student's-t 95% UCL	0.13
Benzo(K)Fluoranthene	0.079	0.088	0.045	Chebychev 95% UCL	0.13
Chrysene	0.17	0.18	0.12	Student's-t 95% UCL	0.21
Dibenz(A,H)Anthracene	0.033	0.037	0.023	Chebychev 95% UCL	0.049
Fluoranthene	0.20	0.13	0.094	Chebychev 95% UCL	0.28
Fluorene	0.011	0.004	0.004	Chebychev 95% UCL	0.017
Indeno(1,2,3-C,D)Pyrene	0.091	0.091	0.062	Student's-t 95% UCL	0.11
Phenanthrene	0.13	0.063	0.052	Chebychev 95% UCL	0.19

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-015-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	0.20	0.13	0.094	Chebychev 95% UCL	0.28
Total HMW PAHs - 1/2MDL	1.08	1.00	0.68	Chebychev 95% UCL	1.46
Total HMW PAHs - MDL	1.08	1.00	0.68	Chebychev 95% UCL	1.46
Total HMW PAHs - Zero	1.08	1.00	0.68	Chebychev 95% UCL	1.46
Total LMW PAHs - 1/2MDL	0.40	0.23	0.17	Chebychev 95% UCL	0.56
Total LMW PAHs - MDL	0.40	0.23	0.17	Chebychev 95% UCL	0.56
Total LMW PAHs - Zero	0.40	0.23	0.17	Chebychev 95% UCL	0.56
Total PAHs - 1/2MDL	1.29	1.02	0.70	Chebychev 95% UCL	1.74
Total PAHs - MDL	1.29	1.02	0.70	Chebychev 95% UCL	1.74
Total PAHs - Zero	1.29	1.02	0.70	Chebychev 95% UCL	1.74
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	0.002	0.003	9.50E-04	Chebychev 95% UCL	0.004
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	--	--	--	--	--
Carbazole	0.023	0.014	0.010	Chebychev 95% UCL	0.032
Dibenzofuran	0.005	0.003	0.003	Chebychev 95% UCL	0.006
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-015-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	28,300	30,100	30,800	Student's-t 95% UCL	31,908
Antimony	0.43	0.39	0.65	Chebychev 95% UCL	0.84
Arsenic	6.90	6.50	9.00	Student's-t 95% UCL	9.73
Barium	126.0	123.0	119.0	Student's-t 95% UCL	128.6
Beryllium	0.95	0.97	1.10	Student's-t 95% UCL	1.14
Cadmium	0.23	0.22	0.34	Chebychev 95% UCL	0.43
Chromium, Hexavalent	0.53	0.60	0.54	Student's-t 95% UCL	0.62
Chromium, Total	19.7	22.5	20.0	Student's-t 95% UCL	23.3
Chromium, Trivalent	19.2	21.9	19.5	Student's-t 95% UCL	22.7
Cobalt	6.10	6.30	6.70	Student's-t 95% UCL	6.88
Copper	17.8	21.5	20.3	Student's-t 95% UCL	23.0
Iron	16,500	17,700	16,500	Student's-t 95% UCL	18,068
Lead	14.6	14.5	19.8	Student's-t 95% UCL	21.4
Manganese	424.0	425.0	418.0	Student's-t 95% UCL	428.7
Mercury	0.011	0.031	0.025	Chebychev 95% UCL	0.049
Nickel	37.7	35.8	64.1	Chebychev 95% UCL	85.7
Selenium	1.80	1.80	4.10	Chebychev 95% UCL	5.91
Silver	0.045	0.048	0.044	Student's-t 95% UCL	0.049
Thallium	0.14	0.15	0.28	Chebychev 95% UCL	0.39
Vanadium	20.4	22.1	29.4	Student's-t 95% UCL	32.0
Zinc	69.6	73.7	67.3	Student's-t 95% UCL	75.7
Other Inorganic Parameters (mg/kg)					
Cyanide	2.30	1.60	3.40	Chebychev 95% UCL	4.72
Fluoride	730.0	639.0	721.0	Student's-t 95% UCL	781.2

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-015-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	25,400	21,600	20,600	Student's-t 95% UCL	26,803
Magnesium	10,500	10,600	10,600	Student's-t 95% UCL	10,664
Potassium	2,260	2,870	2,530	Student's-t 95% UCL	3,069
Sodium	4,630	5,910	4,660	Student's-t 95% UCL	6,298
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	--	--	--	--	--
Polychlorinated Biphenyl (PCBs)	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.009	0.011	0.013	Student's-t 95% UCL	0.014
2-Methylnaphthalene	0.006	0.009	0.008	Student's-t 95% UCL	0.010
Acenaphthene	0.021	0.044	0.023	Chebychev 95% UCL	0.061
Acenaphthylene	0.014	0.030	0.015	Chebychev 95% UCL	0.042
Anthracene	0.14	0.27	0.16	Chebychev 95% UCL	0.37
Benzo(A)Anthracene	1.80	3.00	1.70	Chebychev 95% UCL	3.99
Benzo(A)Pyrene	0.59	1.10	0.60	Chebychev 95% UCL	1.50
Benzo(B)Fluoranthene	9.20	8.70	13.0	Chebychev 95% UCL	16.2
Benzo(G,H,I)Perylene	2.20	2.40	4.30	Chebychev 95% UCL	5.88
Benzo(K)Fluoranthene	1.90	2.20	2.40	Student's-t 95% UCL	2.59
Chrysene	5.10	12.0	6.80	Chebychev 95% UCL	17.0
Dibenz(A,H)Anthracene	1.00	1.00	2.50	Chebychev 95% UCL	3.68
Fluoranthene	1.50	4.20	2.00	Chebychev 95% UCL	6.18
Fluorene	0.017	0.029	0.021	Chebychev 95% UCL	0.038
Indeno(1,2,3-C,D)Pyrene	2.00	2.10	3.50	Chebychev 95% UCL	4.64
Phenanthrene	0.37	0.65	0.56	Chebychev 95% UCL	0.89

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-015-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	1.50	4.40	1.50	Chebychev 95% UCL	6.68
Total HMW PAHs - 1/2MDL	25.3	36.9	36.3	Student's-t 95% UCL	43.8
Total HMW PAHs - MDL	25.3	36.9	36.3	Student's-t 95% UCL	43.8
Total HMW PAHs - Zero	25.3	36.9	36.3	Student's-t 95% UCL	43.8
Total LMW PAHs - 1/2MDL	2.08	5.24	2.80	Chebychev 95% UCL	7.55
Total LMW PAHs - MDL	2.08	5.24	2.81	Chebychev 95% UCL	7.55
Total LMW PAHs - Zero	2.08	5.24	2.79	Chebychev 95% UCL	7.55
Total PAHs - 1/2MDL	18.2	33.4	26.1	Chebychev 95% UCL	45.1
Total PAHs - MDL	18.2	33.4	26.1	Chebychev 95% UCL	45.1
Total PAHs - Zero	18.2	33.4	26.1	Chebychev 95% UCL	45.1
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	--	--	--	--	--
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	--	--	--	--	--
Carbazole	0.12	0.16	0.15	Student's-t 95% UCL	0.18
Dibenzofuran	0.012	0.016	0.018	Student's-t 95% UCL	0.020
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-01-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	24,300	22,100	23,400	Student's-t 95% UCL	25,131
Antimony	0.40	0.085	0.085	Chebychev 95% UCL	0.65
Arsenic	9.30	6.80	7.10	Student's-t 95% UCL	10.0
Barium	184.0	153.0	164.0	Student's-t 95% UCL	193.5
Beryllium	0.90	0.80	0.85	Student's-t 95% UCL	0.93
Cadmium	0.10	0.10	0.11	Student's-t 95% UCL	0.11
Chromium, Hexavalent	0.45	0.40	0.43	Student's-t 95% UCL	0.46
Chromium, Total	16.7	15.1	15.9	Student's-t 95% UCL	17.2
Chromium, Trivalent	16.3	14.7	15.5	Student's-t 95% UCL	16.8
Cobalt	6.50	6.30	6.10	Student's-t 95% UCL	6.64
Copper	14.3	15.0	16.0	Student's-t 95% UCL	16.5
Iron	19,800	18,900	19,300	Student's-t 95% UCL	20,094
Lead	13.7	14.4	13.8	Student's-t 95% UCL	14.6
Manganese	597.0	538.0	530.0	Student's-t 95% UCL	616.7
Mercury	0.025	0.020	0.027	Student's-t 95% UCL	0.030
Nickel	15.3	17.0	15.4	Student's-t 95% UCL	17.5
Selenium	0.51	0.33	0.35	Chebychev 95% UCL	0.64
Silver	0.056	0.039	0.047	Student's-t 95% UCL	0.062
Thallium	0.16	0.14	0.16	Student's-t 95% UCL	0.17
Vanadium	18.4	17.2	17.8	Student's-t 95% UCL	18.8
Zinc	55.4	53.4	56.1	Student's-t 95% UCL	57.3
Other Inorganic Parameters (mg/kg)					
Cyanide	0.90	0.80	1.80	Chebychev 95% UCL	2.55
Fluoride	208.0	260.0	310.0	Student's-t 95% UCL	345.3

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-01-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	3,110	3,110	5,360	Chebychev 95% UCL	7,129
Magnesium	12,400	12,200	12,800	Student's-t 95% UCL	12,982
Potassium	1,660	1,510	1,600	Student's-t 95% UCL	1,717
Sodium	596.0	629.0	834.0	Student's-t 95% UCL	903.7
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	--	--	--	--	--
Polychlorinated Biphenyl (PCBs)	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.005	0.006	0.006	Student's-t 95% UCL	0.007
2-Methylnaphthalene	0.003	0.004	0.003	Student's-t 95% UCL	0.004
Acenaphthene	0.008	0.012	0.009	Chebychev 95% UCL	0.015
Acenaphthylene	--	--	--	--	--
Anthracene	0.012	0.020	0.018	Chebychev 95% UCL	0.027
Benzo(A)Anthracene	0.048	0.10	0.071	Chebychev 95% UCL	0.14
Benzo(A)Pyrene	0.047	0.12	0.083	Chebychev 95% UCL	0.18
Benzo(B)Fluoranthene	0.10	0.18	0.15	Chebychev 95% UCL	0.25
Benzo(G,H,I)Perylene	0.058	0.15	0.084	Chebychev 95% UCL	0.22
Benzo(K)Fluoranthene	0.033	0.065	0.044	Chebychev 95% UCL	0.088
Chrysene	0.092	0.17	0.12	Chebychev 95% UCL	0.23
Dibenz(A,H)Anthracene	0.013	0.036	0.025	Chebychev 95% UCL	0.054
Fluoranthene	0.091	0.18	0.15	Chebychev 95% UCL	0.25
Fluorene	0.007	0.010	0.007	Student's-t 95% UCL	0.011
Indeno(1,2,3-C,D)Pyrene	0.048	0.12	0.072	Chebychev 95% UCL	0.17
Phenanthrene	0.068	0.11	0.092	Chebychev 95% UCL	0.14

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-01-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	0.078	0.18	0.13	Chebychev 95% UCL	0.26
Total HMW PAHs - 1/2MDL	0.52	1.12	0.78	Chebychev 95% UCL	1.57
Total HMW PAHs - MDL	0.52	1.12	0.78	Chebychev 95% UCL	1.57
Total HMW PAHs - Zero	0.52	1.12	0.78	Chebychev 95% UCL	1.57
Total LMW PAHs - 1/2MDL	0.20	0.34	0.29	Chebychev 95% UCL	0.46
Total LMW PAHs - MDL	0.20	0.35	0.29	Chebychev 95% UCL	0.47
Total LMW PAHs - Zero	0.19	0.34	0.28	Chebychev 95% UCL	0.46
Total PAHs - 1/2MDL	0.61	1.28	0.91	Chebychev 95% UCL	1.78
Total PAHs - MDL	0.61	1.28	0.92	Chebychev 95% UCL	1.78
Total PAHs - Zero	0.61	1.28	0.91	Chebychev 95% UCL	1.78
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	0.008	0.013	0.010	Chebychev 95% UCL	0.017
Benzyl Butyl Phthalate	0.039	0.023	0.046	Chebychev 95% UCL	0.066
Biphenyl (Diphenyl)	--	--	--	--	--
Carbazole	0.010	0.020	0.017	Chebychev 95% UCL	0.029
Dibenzofuran	0.005	0.006	0.003	Chebychev 95% UCL	0.008
Isophorone	0.003	0.005	0.003	Chebychev 95% UCL	0.006

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-01-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	26,000	27,700	26,200	Student's-t 95% UCL	28,200
Antimony	0.28	0.23	0.34	Student's-t 95% UCL	0.38
Arsenic	6.30	5.70	9.50	Chebychev 95% UCL	12.3
Barium	204.0	206.0	191.0	Student's-t 95% UCL	214.1
Beryllium	1.10	1.20	1.10	Student's-t 95% UCL	1.23
Cadmium	0.23	0.25	0.29	Student's-t 95% UCL	0.31
Chromium, Hexavalent	0.46	0.48	0.44	Student's-t 95% UCL	0.49
Chromium, Total	17.2	18.0	16.6	Student's-t 95% UCL	18.5
Chromium, Trivalent	16.7	17.5	16.2	Student's-t 95% UCL	18.0
Cobalt	6.20	6.20	6.90	Student's-t 95% UCL	7.11
Copper	17.9	20.1	22.2	Student's-t 95% UCL	23.7
Iron	18,100	19,800	17,500	Student's-t 95% UCL	20,478
Lead	29.6	19.1	152.0	Chebychev 95% UCL	252.8
Manganese	657.0	632.0	588.0	Student's-t 95% UCL	684.6
Mercury	0.018	0.010	0.084	Chebychev 95% UCL	0.14
Nickel	36.9	34.8	28.9	Student's-t 95% UCL	40.5
Selenium	0.40	0.36	0.37	Student's-t 95% UCL	0.41
Silver	0.058	0.066	0.061	Student's-t 95% UCL	0.068
Thallium	0.16	0.15	0.17	Student's-t 95% UCL	0.18
Vanadium	23.6	23.5	21.2	Student's-t 95% UCL	25.1
Zinc	69.7	67.8	100.0	Chebychev 95% UCL	124.6
Other Inorganic Parameters (mg/kg)					
Cyanide	0.82	2.60	3.70	Chebychev 95% UCL	6.03
Fluoride	117.0	175.0	110.0	Chebychev 95% UCL	223.8

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-01-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	12,400	13,200	12,100	Student's-t 95% UCL	13,525
Magnesium	10,900	10,500	10,000	Student's-t 95% UCL	11,227
Potassium	1,790	1,790	1,670	Student's-t 95% UCL	1,867
Sodium	439.0	744.0	437.0	Chebychev 95% UCL	984.6
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	0.068	0.005	0.005	Chebychev 95% UCL	0.12
Polychlorinated Biphenyl (PCBs)	0.068	0.005	0.005	Chebychev 95% UCL	0.12
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.11	0.031	0.017	Chebychev 95% UCL	0.18
2-Methylnaphthalene	0.048	0.027	0.013	Chebychev 95% UCL	0.074
Acenaphthene	0.20	0.11	0.059	Chebychev 95% UCL	0.30
Acenaphthylene	0.029	0.033	0.014	Chebychev 95% UCL	0.051
Anthracene	0.50	0.28	0.15	Chebychev 95% UCL	0.76
Benzo(A)Anthracene	1.60	1.10	0.64	Chebychev 95% UCL	2.32
Benzo(A)Pyrene	1.70	1.20	0.73	Chebychev 95% UCL	2.43
Benzo(B)Fluoranthene	2.80	3.10	1.20	Chebychev 95% UCL	4.94
Benzo(G,H,I)Perylene	2.20	2.30	1.10	Chebychev 95% UCL	3.54
Benzo(K)Fluoranthene	1.10	1.10	0.41	Chebychev 95% UCL	1.87
Chrysene	2.50	2.40	1.10	Chebychev 95% UCL	3.97
Dibenz(A,H)Anthracene	0.58	0.60	0.25	Chebychev 95% UCL	0.97
Fluoranthene	3.10	2.10	1.20	Chebychev 95% UCL	4.53
Fluorene	0.16	0.079	0.040	Chebychev 95% UCL	0.25
Indeno(1,2,3-C,D)Pyrene	1.60	1.70	0.74	Chebychev 95% UCL	2.67
Phenanthrene	1.80	1.00	0.69	Chebychev 95% UCL	2.60

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-01-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	3.20	2.10	1.20	Chebychev 95% UCL	4.69
Total HMW PAHs - 1/2MDL	17.3	15.6	7.37	Chebychev 95% UCL	26.8
Total HMW PAHs - MDL	17.3	15.6	7.37	Chebychev 95% UCL	26.8
Total HMW PAHs - Zero	17.3	15.6	7.37	Chebychev 95% UCL	26.8
Total LMW PAHs - 1/2MDL	5.95	3.66	2.18	Chebychev 95% UCL	8.70
Total LMW PAHs - MDL	5.95	3.66	2.18	Chebychev 95% UCL	8.70
Total LMW PAHs - Zero	5.95	3.66	2.18	Chebychev 95% UCL	8.70
Total PAHs - 1/2MDL	20.4	16.1	8.34	Chebychev 95% UCL	30.3
Total PAHs - MDL	20.4	16.1	8.34	Chebychev 95% UCL	30.3
Total PAHs - Zero	20.4	16.1	8.34	Chebychev 95% UCL	30.3
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	0.018	0.026	0.010	Chebychev 95% UCL	0.038
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	--	--	--	--	--
Carbazole	0.34	0.22	0.11	Chebychev 95% UCL	0.51
Dibenzofuran	0.090	0.045	0.024	Chebychev 95% UCL	0.14
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-04-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	21,300	21,600	21,300	Student's-t 95% UCL	21,692
Antimony	--	--	--	--	--
Arsenic	6.90	6.20	6.40	Student's-t 95% UCL	7.11
Barium	129.0	120.0	137.0	Student's-t 95% UCL	143.0
Beryllium	0.73	0.69	0.67	Student's-t 95% UCL	0.75
Cadmium	0.071	0.067	0.079	Student's-t 95% UCL	0.083
Chromium, Hexavalent	0.41	0.41	0.41	Student's-t 95% UCL	0.42
Chromium, Total	15.5	15.4	15.3	Student's-t 95% UCL	15.6
Chromium, Trivalent	15.1	15.0	14.9	Student's-t 95% UCL	15.2
Cobalt	6.30	6.40	6.30	Student's-t 95% UCL	6.43
Copper	15.3	14.6	16.2	Student's-t 95% UCL	16.7
Iron	19,600	19,700	19,900	Student's-t 95% UCL	19,991
Lead	13.1	13.1	13.3	Student's-t 95% UCL	13.4
Manganese	492.0	464.0	527.0	Student's-t 95% UCL	547.5
Mercury	0.009	0.020	0.020	Chebychev 95% UCL	0.033
Nickel	14.5	14.3	14.6	Student's-t 95% UCL	14.7
Selenium	0.56	0.44	0.62	Student's-t 95% UCL	0.69
Silver	0.039	0.039	0.040	Student's-t 95% UCL	0.040
Thallium	0.13	0.13	0.13	Student's-t 95% UCL	0.13
Vanadium	15.6	15.8	16.2	Student's-t 95% UCL	16.4
Zinc	51.6	51.1	56.3	Student's-t 95% UCL	57.8
Other Inorganic Parameters (mg/kg)					
Cyanide	0.36	0.34	0.48	Student's-t 95% UCL	0.52
Fluoride	55.8	76.2	30.8	Chebychev 95% UCL	111.5

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-04-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	2,800	2,510	2,540	Student's-t 95% UCL	2,886
Magnesium	12,600	12,800	12,500	Student's-t 95% UCL	12,891
Potassium	1,150	1,150	1,120	Student's-t 95% UCL	1,169
Sodium	243.0	268.0	210.0	Student's-t 95% UCL	289.4
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	--	--	--	--	--
Polychlorinated Biphenyl (PCBs)	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.051	0.062	0.015	Chebychev 95% UCL	0.10
2-Methylnaphthalene	0.007	0.036	0.006	Chebychev 95% UCL	0.059
Acenaphthene	1.70	0.16	0.022	Chebychev 95% UCL	2.97
Acenaphthylene	0.028	7.00E-04	7.00E-04	Chebychev 95% UCL	0.049
Anthracene	4.00	0.18	0.037	Chebychev 95% UCL	7.06
Benzo(A)Anthracene	13.0	0.38	0.13	Chebychev 95% UCL	23.0
Benzo(A)Pyrene	7.70	0.38	0.13	Chebychev 95% UCL	13.6
Benzo(B)Fluoranthene	21.0	0.57	0.21	Chebychev 95% UCL	37.2
Benzo(G,H,I)Perylene	6.60	0.34	0.13	Chebychev 95% UCL	11.6
Benzo(K)Fluoranthene	5.80	0.18	0.065	Chebychev 95% UCL	10.3
Chrysene	24.0	0.56	0.18	Chebychev 95% UCL	42.6
Dibenz(A,H)Anthracene	2.20	0.097	0.035	Chebychev 95% UCL	3.88
Fluoranthene	27.0	0.70	0.23	Chebychev 95% UCL	47.9
Fluorene	1.40	0.15	0.019	Chebychev 95% UCL	2.44
Indeno(1,2,3-C,D)Pyrene	5.60	0.28	0.11	Chebychev 95% UCL	9.85
Phenanthrene	19.0	0.74	0.17	Chebychev 95% UCL	33.6

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-04-SO-0.5-2				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	23.0	0.64	0.22	Chebychev 95% UCL	40.8
Total HMW PAHs - 1/2MDL	108.9	3.43	1.21	Chebychev 95% UCL	192.7
Total HMW PAHs - MDL	108.9	3.43	1.21	Chebychev 95% UCL	192.7
Total HMW PAHs - Zero	108.9	3.43	1.21	Chebychev 95% UCL	192.7
Total LMW PAHs - 1/2MDL	53.2	2.03	0.50	Chebychev 95% UCL	94.0
Total LMW PAHs - MDL	53.2	2.03	0.50	Chebychev 95% UCL	94.0
Total LMW PAHs - Zero	53.2	2.03	0.50	Chebychev 95% UCL	94.0
Total PAHs - 1/2MDL	141.1	4.85	1.49	Chebychev 95% UCL	249.6
Total PAHs - MDL	141.1	4.85	1.49	Chebychev 95% UCL	249.6
Total PAHs - Zero	141.1	4.85	1.49	Chebychev 95% UCL	249.6
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	0.007	0.002	0.003	Chebychev 95% UCL	0.011
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	0.024	0.009	0.002	Chebychev 95% UCL	0.040
Carbazole	2.30	0.12	0.024	Chebychev 95% UCL	4.05
Dibenzofuran	0.65	0.083	0.012	Chebychev 95% UCL	1.13
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-04-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
TAL Metals (mg/kg)					
Aluminum	23,600	24,400	23,900	Student's-t 95% UCL	24,648
Antimony	0.20	0.19	0.085	Chebychev 95% UCL	0.32
Arsenic	5.30	5.50	5.30	Student's-t 95% UCL	5.56
Barium	182.0	197.0	204.0	Student's-t 95% UCL	213.3
Beryllium	0.89	0.98	0.83	Student's-t 95% UCL	1.03
Cadmium	0.20	0.21	0.23	Student's-t 95% UCL	0.24
Chromium, Hexavalent	0.39	0.42	0.38	Student's-t 95% UCL	0.43
Chromium, Total	14.5	15.7	14.2	Student's-t 95% UCL	16.1
Chromium, Trivalent	14.1	15.3	13.8	Student's-t 95% UCL	15.7
Cobalt	6.20	6.10	6.10	Student's-t 95% UCL	6.23
Copper	14.6	17.1	14.6	Student's-t 95% UCL	17.9
Iron	18,600	18,000	18,600	Student's-t 95% UCL	18,984
Lead	20.5	19.1	16.6	Student's-t 95% UCL	22.1
Manganese	651.0	752.0	836.0	Student's-t 95% UCL	902.5
Mercury	0.021	0.031	0.018	Chebychev 95% UCL	0.040
Nickel	22.1	22.9	20.9	Student's-t 95% UCL	23.7
Selenium	0.44	0.52	0.46	Student's-t 95% UCL	0.54
Silver	0.039	0.043	0.044	Student's-t 95% UCL	0.046
Thallium	0.16	0.16	0.14	Student's-t 95% UCL	0.17
Vanadium	21.0	22.0	19.8	Student's-t 95% UCL	22.8
Zinc	67.1	71.5	75.1	Student's-t 95% UCL	78.0
Other Inorganic Parameters (mg/kg)					
Cyanide	1.40	3.10	1.30	Chebychev 95% UCL	4.48
Fluoride	58.6	62.5	34.3	Chebychev 95% UCL	90.3

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-04-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Essential Nutrients (mg/kg)					
Calcium	5,310	6,450	4,090	Chebychev 95% UCL	8,254
Magnesium	10,700	9,850	10,600	Student's-t 95% UCL	11,167
Potassium	1,470	1,710	1,530	Student's-t 95% UCL	1,781
Sodium	209.0	674.0	344.0	Chebychev 95% UCL	1,011
Polychlorinated Biphenyls (PCBs) (mg/kg)					
PCB-1254 (Aroclor 1254)	--	--	--	--	--
Polychlorinated Biphenyl (PCBs)	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)					
Naphthalene	0.21	0.45	0.14	Chebychev 95% UCL	0.68
2-Methylnaphthalene	0.087	0.23	0.088	Chebychev 95% UCL	0.34
Acenaphthene	0.73	1.50	1.40	Chebychev 95% UCL	2.26
Acenaphthylene	0.022	0.035	0.033	Chebychev 95% UCL	0.048
Anthracene	1.60	2.60	3.20	Chebychev 95% UCL	4.50
Benzo(A)Anthracene	9.50	9.60	11.0	Student's-t 95% UCL	11.4
Benzo(A)Pyrene	6.70	9.80	11.0	Chebychev 95% UCL	14.8
Benzo(B)Fluoranthene	21.0	15.0	20.0	Student's-t 95% UCL	24.1
Benzo(G,H,I)Perylene	6.80	7.40	9.30	Student's-t 95% UCL	10.0
Benzo(K)Fluoranthene	4.50	6.10	6.30	Student's-t 95% UCL	7.30
Chrysene	22.0	14.0	18.0	Student's-t 95% UCL	24.7
Dibenz(A,H)Anthracene	2.10	2.10	2.70	Student's-t 95% UCL	2.88
Fluoranthene	17.0	14.0	21.0	Student's-t 95% UCL	23.3
Fluorene	0.60	1.30	1.10	Chebychev 95% UCL	1.91
Indeno(1,2,3-C,D)Pyrene	5.40	6.20	7.20	Student's-t 95% UCL	7.79
Phenanthrene	8.30	10.0	15.0	Chebychev 95% UCL	19.9

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Name	CFISS-04-SO-0-0.5				
Constituent	Rep 1	Rep 2	Rep 3	UCL Type	UCL Value
Pyrene	17.0	15.0	19.0	Student's-t 95% UCL	20.4
Total HMW PAHs - 1/2MDL	95.0	85.2	104.5	Student's-t 95% UCL	111.2
Total HMW PAHs - MDL	95.0	85.2	104.5	Student's-t 95% UCL	111.2
Total HMW PAHs - Zero	95.0	85.2	104.5	Student's-t 95% UCL	111.2
Total LMW PAHs - 1/2MDL	28.5	30.1	42.0	Student's-t 95% UCL	45.9
Total LMW PAHs - MDL	28.5	30.2	42.0	Student's-t 95% UCL	45.9
Total LMW PAHs - Zero	28.5	30.1	42.0	Student's-t 95% UCL	45.9
Total PAHs - 1/2MDL	102.5	100.1	126.4	Student's-t 95% UCL	134.2
Total PAHs - MDL	102.5	100.1	126.4	Student's-t 95% UCL	134.1
Total PAHs - Zero	102.5	100.1	126.4	Student's-t 95% UCL	134.2
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)					
Acetophenone	--	--	--	--	--
Benzyl Butyl Phthalate	--	--	--	--	--
Biphenyl (Diphenyl)	0.035	0.075	0.033	Chebychev 95% UCL	0.11
Carbazole	0.93	1.50	2.00	Chebychev 95% UCL	2.82
Dibenzofuran	0.38	0.77	0.53	Chebychev 95% UCL	1.06
Isophorone	--	--	--	--	--

Appendix J1
Summary of ITRC UCL Results for Triplicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

-- - No data or not available

Gray - Non-detect. Replaced with 1/2 the MDL.

HMW - High molecular weight

LMW - Low molecular weight

mg/kg - milligram per kilogram

MDL - Method Detection Limit

PAH - Polycyclic Aromatic Hydrocarbons

PCB - Polychlorinated Biphenyls

SVOC - Semi-volatile organic compound

TAL - Target Analyte List

TCL - Target Compound List

UCL - Upper confidence limit



Appendix J2 Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-002			
	0.00-0.50			
	CFISS-002-SO-0-0.5			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	37,700	4.68%	35,935	39,465
Antimony	0.21	28.1%	0.15	0.27
Arsenic	4.60	13.8%	3.96	5.24
Barium	220	4.03%	211	229
Beryllium	3.70	6.32%	3.47	3.93
Cadmium	0.25	15.0%	0.21	0.29
Chromium, Total	18.6	10.6%	16.6	20.6
Chromium, Hexavalent	0.50	10.6%	0.45	0.55
Chromium, Trivalent	18.1	10.6%	16.2	20.0
Cobalt	5.40	3.51%	5.21	5.59
Copper	16.9	12.3%	14.8	19.0
Iron	15,000	3.40%	14,490	15,510
Lead	17.3	48.5%	8.91	25.7
Manganese	502	5.63%	474	530
Mercury	0.019	54.9%	0.009	0.029
Nickel	44.5	14.5%	38.1	50.9
Selenium	0.74	20.0%	0.59	0.89
Silver	0.056	9.03%	0.051	0.061
Thallium	0.17	14.4%	0.15	0.19
Vanadium	35.8	9.21%	32.5	39.1
Zinc	59.2	12.7%	51.7	66.7
Other Inorganic Parameters (mg/kg)				
Cyanide	18.2	40.2%	10.9	25.5
Fluoride	976	20.5%	776	1,176
Essential Nutrients (mg/kg)				
Calcium	22,000	10.7%	19,653	24,347
Magnesium	10,100	2.82%	9,815	10,385
Potassium	3,080	6.24%	2,888	3,272
Sodium	9,000	30.7%	6,233	11,767
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.50E-04	--	4.50E-04	4.50E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.50E-04	--	4.50E-04	4.50E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.70E-04	--	4.70E-04	4.70E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-002			
	0.00-0.50			
	CFISS-002-SO-0-0.5			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.011	47.1%	0.006	0.016
Acenaphthene	0.040	42.0%	0.023	0.057
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.083	37.7%	0.052	0.11
Fluoranthene	0.86	37.3%	0.54	1.18
Fluorene	0.037	34.6%	0.024	0.050
Naphthalene	0.022	44.9%	0.012	0.032
Phenanthrene	0.49	31.0%	0.34	0.64
Total LMW PAHs - 1/2MDL	1.55	35.8%	0.99	2.10
Total LMW PAHs - MDL	1.55	35.8%	1.00	2.11
Total LMW PAHs - Zero	1.54	35.9%	0.99	2.10
Benzo(A)Pyrene	0.38	36.1%	0.24	0.52
Benzo(A)Anthracene	0.37	32.0%	0.25	0.49
Benzo(B)Fluoranthene	0.75	29.8%	0.53	0.97
Benzo(G,H,I)Perylene	0.34	30.8%	0.24	0.44
Benzo(K)Fluoranthene	0.26	31.3%	0.18	0.34
Chrysene	0.65	35.9%	0.42	0.88
Dibenz(A,H)Anthracene	0.092	39.8%	0.055	0.13
Indeno(1,2,3-C,D)Pyrene	0.38	31.1%	0.26	0.50
Pyrene	0.70	39.3%	0.42	0.98
Total HMW PAHs - 1/2MDL	3.92	26.8%	2.87	4.97
Total HMW PAHs - MDL	3.92	26.8%	2.87	4.97
Total HMW PAHs - Zero	3.92	26.8%	2.87	4.97
Total PAHs - 1/2MDL	4.71	29.6%	3.32	6.10
Total PAHs - MDL	4.71	29.5%	3.32	6.10
Total PAHs - Zero	4.70	29.6%	3.31	6.09
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-002			
	0.00-0.50			
	CFISS-002-SO-0-0.5			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.065	30.5%	0.045	0.085
Dibenzofuran	0.026	33.5%	0.017	0.035
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-002			
	0.50-2.00			
	CFISS-002-SO-0.5-2			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	22,000	4.58%	20,993	23,007
Antimony	0.11	70.4%	0.033	0.19
Arsenic	6.40	7.46%	5.92	6.88
Barium	164	9.24%	149	179
Beryllium	1.10	4.90%	1.05	1.15
Cadmium	0.080	6.03%	0.075	0.085
Chromium, Total	18.2	7.75%	16.8	19.6
Chromium, Hexavalent	0.49	7.75%	0.45	0.52
Chromium, Trivalent	17.7	7.75%	16.3	19.1
Cobalt	5.90	1.99%	5.78	6.02
Copper	15.0	4.63%	14.3	15.7
Iron	19,500	2.40%	19,032	19,968
Lead	12.1	3.33%	11.7	12.5
Manganese	629	7.15%	584	674
Mercury	0.026	27.4%	0.019	0.033
Nickel	15.8	6.58%	14.8	16.8
Selenium	0.85	19.1%	0.69	1.01
Silver	0.035	9.83%	0.032	0.038
Thallium	0.13	6.56%	0.12	0.14
Vanadium	21.5	3.31%	20.8	22.2
Zinc	56.6	5.42%	53.5	59.7
Other Inorganic Parameters (mg/kg)				
Cyanide	3.90	32.7%	2.63	5.17
Fluoride	647	28.8%	461	833
Essential Nutrients (mg/kg)				
Calcium	6,100	15.1%	5,176	7,024
Magnesium	11,800	2.18%	11,543	12,057
Potassium	1,440	6.91%	1,340	1,540
Sodium	2,090	21.1%	1,649	2,531
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-002			
	0.50-2.00			
	CFISS-002-SO-0.5-2			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.7%	0.002	0.005
Acenaphthene	0.004	80.9%	7.72E-04	0.007
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.016	82.4%	0.003	0.029
Fluoranthene	0.021	71.4%	0.006	0.036
Fluorene	0.004	74.2%	9.43E-04	0.006
Naphthalene	0.004	28.9%	0.003	0.005
Phenanthrene	0.011	78.1%	0.002	0.020
Total LMW PAHs - 1/2MDL	0.068	74.3%	0.017	0.12
Total LMW PAHs - MDL	0.10	74.3%	0.027	0.18
Total LMW PAHs - Zero	0.032	74.3%	0.008	0.056
Benzo(A)Pyrene	0.005	67.2%	0.002	0.008
Benzo(A)Anthracene	0.014	68.8%	0.004	0.024
Benzo(B)Fluoranthene	0.039	60.1%	0.016	0.062
Benzo(G,H,I)Perylene	0.010	60.8%	0.004	0.015
Benzo(K)Fluoranthene	0.008	64.5%	0.003	0.012
Chrysene	0.023	62.9%	0.009	0.037
Dibenz(A,H)Anthracene	0.009	63.9%	0.003	0.014
Indeno(1,2,3-C,D)Pyrene	0.011	62.0%	0.004	0.018
Pyrene	0.017	72.7%	0.005	0.029
Total HMW PAHs - 1/2MDL	0.13	64.7%	0.047	0.22
Total HMW PAHs - MDL	0.19	64.7%	0.067	0.31
Total HMW PAHs - Zero	0.079	64.7%	0.028	0.13
Total PAHs - 1/2MDL	0.16	68.3%	0.051	0.27
Total PAHs - MDL	0.25	68.3%	0.078	0.42
Total PAHs - Zero	0.072	68.3%	0.023	0.12
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-002			
	0.50-2.00			
	CFISS-002-SO-0.5-2			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.015	98.2%	2.61E-04	0.029
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.004	76.1%	9.92E-04	0.007
Dibenzofuran	0.005	70.0%	0.001	0.009
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-003			
	0.00-0.50			
	CFISS-03-SO-0-0.5			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	28,200	4.68%	26,880	29,520
Antimony	0.19	28.1%	0.14	0.24
Arsenic	4.90	13.8%	4.22	5.58
Barium	181	4.03%	174	188
Beryllium	1.70	6.32%	1.59	1.81
Cadmium	0.27	15.0%	0.23	0.31
Chromium, Total	19.2	10.6%	17.2	21.2
Chromium, Hexavalent	0.51	10.6%	0.46	0.57
Chromium, Trivalent	18.7	10.6%	16.7	20.7
Cobalt	5.80	3.51%	5.60	6.00
Copper	23.9	12.3%	21.0	26.8
Iron	17,200	3.40%	16,615	17,785
Lead	20.9	48.5%	10.8	31.0
Manganese	563	5.63%	531	595
Mercury	0.023	54.9%	0.010	0.036
Nickel	26.7	14.5%	22.8	30.6
Selenium	0.40	20.0%	0.32	0.48
Silver	0.060	9.03%	0.055	0.065
Thallium	0.15	14.4%	0.13	0.17
Vanadium	24.3	9.21%	22.1	26.5
Zinc	68.8	12.7%	60.1	77.5
Other Inorganic Parameters (mg/kg)				
Cyanide	4.40	40.2%	2.63	6.17
Fluoride	224	20.5%	178	270
Essential Nutrients (mg/kg)				
Calcium	20,900	10.7%	18,671	23,129
Magnesium	11,600	2.82%	11,273	11,927
Potassium	2,260	6.24%	2,119	2,401
Sodium	2,210	30.7%	1,531	2,889
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.45E-04	--	3.45E-04	3.45E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.80E-04	--	3.80E-04	3.80E-04
Beta Endosulfan	8.50E-04	--	8.50E-04	8.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.40E-04	--	4.40E-04	4.40E-04
Endosulfan Sulfate	4.25E-04	--	4.25E-04	4.25E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.00E-04	--	4.00E-04	4.00E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.00E-04	--	4.00E-04	4.00E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-003			
	0.00-0.50			
	CFISS-03-SO-0-0.5			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	140%	-1.86E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.86E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.45	47.1%	0.24	0.66
Acenaphthene	1.90	42.0%	1.10	2.70
Acenaphthylene	0.072	36.1%	0.046	0.098
Anthracene	3.70	37.7%	2.31	5.09
Fluoranthene	17.0	37.3%	10.7	23.3
Fluorene	1.90	34.6%	1.24	2.56
Naphthalene	1.20	44.9%	0.66	1.74
Phenanthrene	14.0	31.0%	9.66	18.3
Total LMW PAHs - 1/2MDL	40.2	35.8%	25.8	54.6
Total LMW PAHs - MDL	40.2	35.8%	25.8	54.6
Total LMW PAHs - Zero	40.2	35.9%	25.8	54.7
Benzo(A)Pyrene	11.0	36.1%	7.02	15.0
Benzo(A)Anthracene	11.0	32.0%	7.48	14.5
Benzo(B)Fluoranthene	16.0	29.8%	11.2	20.8
Benzo(G,H,I)Perylene	9.00	30.8%	6.23	11.8
Benzo(K)Fluoranthene	4.70	31.3%	3.23	6.17
Chrysene	15.0	35.9%	9.62	20.4
Dibenz(A,H)Anthracene	2.10	39.8%	1.26	2.94
Indeno(1,2,3-C,D)Pyrene	7.20	31.1%	4.96	9.44
Pyrene	17.0	39.3%	10.3	23.7
Total HMW PAHs - 1/2MDL	93.0	26.8%	68.1	118
Total HMW PAHs - MDL	93.0	26.8%	68.1	118
Total HMW PAHs - Zero	93.0	26.8%	68.1	118
Total PAHs - 1/2MDL	117	29.6%	82.3	151
Total PAHs - MDL	117	29.5%	82.3	151
Total PAHs - Zero	117	29.6%	82.3	151
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.035	--	0.035	0.035
1,4-Dioxane (P-Dioxane)	0.26	--	0.26	0.26
2,3,4,6-Tetrachlorophenol	0.34	--	0.34	0.34
2,4,5-Trichlorophenol	0.060	--	0.060	0.060
2,4,6-Trichlorophenol	0.045	--	0.045	0.045
2,4-Dichlorophenol	0.065	--	0.065	0.065
2,4-Dimethylphenol	0.050	--	0.050	0.050

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-003			
	0.00-0.50			
	CFISS-03-SO-0-0.5			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	2.20	--	2.20	2.20
2,4-Dinitrotoluene	0.041	--	0.041	0.041
2,6-Dinitrotoluene	0.050	--	0.050	0.050
2-Chloronaphthalene	0.037	--	0.037	0.037
2-Chlorophenol	0.038	--	0.038	0.038
2-Methylphenol (O-Cresol)	0.24	--	0.24	0.24
2-Nitroaniline	0.37	--	0.37	0.37
2-Nitrophenol	0.047	--	0.047	0.047
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.75	--	0.75	0.75
3-Nitroaniline	0.21	--	0.21	0.21
4,6-Dinitro-2-Methylphenol	1.40	--	1.40	1.40
4-Bromophenyl Phenyl Ether	0.055	--	0.055	0.055
4-Chloro-3-Methylphenol	0.038	--	0.038	0.038
4-Chloroaniline	0.027	--	0.027	0.027
4-Chlorophenyl Phenyl Ether	0.049	--	0.049	0.049
4-Nitroaniline	0.040	--	0.040	0.040
4-Nitrophenol	0.55	--	0.55	0.55
Acetophenone	0.044	44.4%	0.024	0.064
Atrazine	0.36	--	0.36	0.36
Benzaldehyde	0.10	--	0.10	0.10
Benzyl Butyl Phthalate	1.40	--	1.40	1.40
Biphenyl (Diphenyl)	0.14	49.7%	0.070	0.21
Bis(2-Chloroethoxy) Methane	0.039	--	0.039	0.039
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.030	--	0.030	0.030
Bis(2-Chloroisopropyl) Ether	0.060	--	0.060	0.060
Bis(2-Ethylhexyl) Phthalate	0.85	--	0.85	0.85
Caprolactam	0.55	--	0.55	0.55
Carbazole	2.20	30.5%	1.53	2.87
Dibenzofuran	1.20	33.5%	0.80	1.60
Diethyl Phthalate	0.25	--	0.25	0.25
Dimethyl Phthalate	0.030	--	0.030	0.030
Di-N-Butyl Phthalate	0.36	--	0.36	0.36
Di-N-Octylphthalate	0.47	--	0.47	0.47
Hexachlorobenzene	0.060	--	0.060	0.060
Hexachlorobutadiene	0.048	--	0.048	0.048
Hexachlorocyclopentadiene	0.042	--	0.042	0.042
Hexachloroethane	0.042	--	0.042	0.042
Isophorone	0.042	--	0.042	0.042
Nitrobenzene	0.30	--	0.30	0.30
N-Nitrosodi-N-Propylamine	0.055	--	0.055	0.055
N-Nitrosodiphenylamine	0.27	--	0.27	0.27
Pentachlorophenol	1.30	--	1.30	1.30
Phenol	0.25	--	0.25	0.25

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-003			
	0.50-2.00			
	CFISS-03-SO-0.5-2			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	23,500	4.58%	22,425	24,575
Antimony	0.085	70.4%	0.025	0.14
Arsenic	6.30	7.46%	5.83	6.77
Barium	148	9.24%	134	162
Beryllium	1.80	4.90%	1.71	1.89
Cadmium	0.10	6.03%	0.094	0.11
Chromium, Total	19.7	7.75%	18.2	21.2
Chromium, Hexavalent	0.53	7.75%	0.49	0.57
Chromium, Trivalent	19.2	7.75%	17.7	20.7
Cobalt	6.00	1.99%	5.88	6.12
Copper	17.3	4.63%	16.5	18.1
Iron	19,200	2.40%	18,739	19,661
Lead	13.7	3.33%	13.2	14.2
Manganese	523	7.15%	486	560
Mercury	0.021	27.4%	0.015	0.027
Nickel	15.7	6.58%	14.7	16.7
Selenium	0.47	19.1%	0.38	0.56
Silver	0.052	9.83%	0.047	0.057
Thallium	0.15	6.56%	0.14	0.16
Vanadium	18.7	3.31%	18.1	19.3
Zinc	51.5	5.42%	48.7	54.3
Other Inorganic Parameters (mg/kg)				
Cyanide	2.20	32.7%	1.48	2.92
Fluoride	302	28.8%	215	389
Essential Nutrients (mg/kg)				
Calcium	7,960	15.1%	6,755	9,165
Magnesium	12,100	2.18%	11,836	12,364
Potassium	1,700	6.91%	1,582	1,818
Sodium	1,750	21.1%	1,381	2,119
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-003			
	0.50-2.00			
	CFISS-03-SO-0.5-2			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	4.00	47.7%	2.09	5.91
Acenaphthene	22.0	80.9%	4.19	39.8
Acenaphthylene	0.28	62.8%	0.10	0.46
Anthracene	50.0	82.4%	8.82	91.2
Fluoranthene	180	71.4%	51.4	309
Fluorene	22.0	74.2%	5.68	38.3
Naphthalene	12.0	28.9%	8.54	15.5
Phenanthrene	180	78.1%	39.4	321
Total LMW PAHs - 1/2MDL	470	74.3%	121	820
Total LMW PAHs - MDL	470	74.3%	121	820
Total LMW PAHs - Zero	470	74.3%	121	820
Benzo(A)Pyrene	92.0	67.2%	30.1	154
Benzo(A)Anthracene	91.0	68.8%	28.4	154
Benzo(B)Fluoranthene	100	60.1%	39.9	160
Benzo(G,H,I)Perylene	62.0	60.8%	24.3	99.7
Benzo(K)Fluoranthene	39.0	64.5%	13.8	64.2
Chrysene	97.0	62.9%	36.0	158
Dibenz(A,H)Anthracene	17.0	63.9%	6.15	27.9
Indeno(1,2,3-C,D)Pyrene	53.0	62.0%	20.1	85.9
Pyrene	160	72.7%	43.7	276
Total HMW PAHs - 1/2MDL	711	64.7%	251	1,171
Total HMW PAHs - MDL	711	64.7%	251	1,171
Total HMW PAHs - Zero	711	64.7%	251	1,171
Total PAHs - 1/2MDL	1,077	68.3%	341	1,813
Total PAHs - MDL	1,077	68.3%	341	1,813
Total PAHs - Zero	1,077	68.3%	341	1,813
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.075	--	0.075	0.075
1,4-Dioxane (P-Dioxane)	0.55	--	0.55	0.55
2,3,4,6-Tetrachlorophenol	0.70	--	0.70	0.70
2,4,5-Trichlorophenol	0.12	--	0.12	0.12
2,4,6-Trichlorophenol	0.090	--	0.090	0.090
2,4-Dichlorophenol	0.13	--	0.13	0.13
2,4-Dimethylphenol	0.11	--	0.11	0.11

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-003			
	0.50-2.00			
	CFISS-03-SO-0.5-2			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	4.55	--	4.55	4.55
2,4-Dinitrotoluene	0.085	--	0.085	0.085
2,6-Dinitrotoluene	0.11	--	0.11	0.11
2-Chloronaphthalene	0.075	--	0.075	0.075
2-Chlorophenol	0.080	--	0.080	0.080
2-Methylphenol (O-Cresol)	0.49	--	0.49	0.49
2-Nitroaniline	0.75	--	0.75	0.75
2-Nitrophenol	0.095	--	0.095	0.095
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	1.55	--	1.55	1.55
3-Nitroaniline	0.43	--	0.43	0.43
4,6-Dinitro-2-Methylphenol	2.90	--	2.90	2.90
4-Bromophenyl Phenyl Ether	0.12	--	0.12	0.12
4-Chloro-3-Methylphenol	0.080	--	0.080	0.080
4-Chloroaniline	0.055	--	0.055	0.055
4-Chlorophenyl Phenyl Ether	0.10	--	0.10	0.10
4-Nitroaniline	0.080	--	0.080	0.080
4-Nitrophenol	1.20	--	1.20	1.20
Acetophenone	0.090	41.1%	0.053	0.13
Atrazine	0.75	--	0.75	0.75
Benzaldehyde	0.21	--	0.21	0.21
Benzyl Butyl Phthalate	1.15	32.7%	0.77	1.53
Biphenyl (Diphenyl)	1.30	98.2%	0.023	2.58
Bis(2-Chloroethoxy) Methane	0.080	--	0.080	0.080
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.060	--	0.060	0.060
Bis(2-Chloroisopropyl) Ether	0.13	--	0.13	0.13
Bis(2-Ethylhexyl) Phthalate	1.80	--	1.80	1.80
Caprolactam	1.10	--	1.10	1.10
Carbazole	26.0	76.1%	6.22	45.8
Dibenzofuran	13.0	70.0%	3.90	22.1
Diethyl Phthalate	0.50	--	0.50	0.50
Dimethyl Phthalate	0.060	--	0.060	0.060
Di-N-Butyl Phthalate	0.75	--	0.75	0.75
Di-N-Octylphthalate	1.00	--	1.00	1.00
Hexachlorobenzene	0.12	--	0.12	0.12
Hexachlorobutadiene	0.10	--	0.10	0.10
Hexachlorocyclopentadiene	0.085	--	0.085	0.085
Hexachloroethane	0.085	--	0.085	0.085
Isophorone	0.085	32.5%	0.057	0.11
Nitrobenzene	0.60	--	0.60	0.60
N-Nitrosodi-N-Propylamine	0.12	--	0.12	0.12
N-Nitrosodiphenylamine	0.55	--	0.55	0.55
Pentachlorophenol	2.70	--	2.70	2.70
Phenol	0.50	--	0.50	0.50

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-005			
	0.00-0.50			
	CFISS-05-SO-0-0.5			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	21,400	4.68%	20,398	22,402
Antimony	1.20	28.1%	0.86	1.54
Arsenic	5.30	13.8%	4.57	6.03
Barium	163	4.03%	156	170
Beryllium	0.80	6.32%	0.75	0.85
Cadmium	0.31	15.0%	0.26	0.36
Chromium, Total	17.8	10.6%	15.9	19.7
Chromium, Hexavalent	0.48	10.6%	0.43	0.53
Chromium, Trivalent	17.3	10.6%	15.5	19.2
Cobalt	6.10	3.51%	5.89	6.31
Copper	381	12.3%	334	428
Iron	17,100	3.40%	16,519	17,681
Lead	67.2	48.5%	34.6	99.8
Manganese	575	5.63%	543	607
Mercury	0.018	54.9%	0.008	0.028
Nickel	29.7	14.5%	25.4	34.0
Selenium	0.50	20.0%	0.40	0.60
Silver	0.058	9.03%	0.053	0.063
Thallium	0.13	14.4%	0.11	0.15
Vanadium	19.5	9.21%	17.7	21.3
Zinc	117	12.7%	102	132
Other Inorganic Parameters (mg/kg)				
Cyanide	0.28	40.2%	0.17	0.39
Fluoride	79.7	20.5%	63.3	96.1
Essential Nutrients (mg/kg)				
Calcium	18,000	10.7%	16,080	19,920
Magnesium	11,300	2.82%	10,981	11,619
Potassium	1,730	6.24%	1,622	1,838
Sodium	169	30.7%	117	221
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.45E-04	--	3.45E-04	3.45E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.85E-04	--	3.85E-04	3.85E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.45E-04	--	4.45E-04	4.45E-04
Endosulfan Sulfate	4.30E-04	--	4.30E-04	4.30E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.05E-04	--	4.05E-04	4.05E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.05E-04	--	4.05E-04	4.05E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-005			
	0.00-0.50			
	CFISS-05-SO-0-0.5			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.057	140%	-2.26E-02	0.14
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.057	140%	-2.26E-02	0.14
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.55	47.1%	0.29	0.81
Acenaphthene	2.50	42.0%	1.45	3.55
Acenaphthylene	0.048	36.1%	0.031	0.065
Anthracene	4.80	37.7%	2.99	6.61
Fluoranthene	24.0	37.3%	15.0	33.0
Fluorene	2.30	34.6%	1.50	3.10
Naphthalene	1.50	44.9%	0.83	2.17
Phenanthrene	18.0	31.0%	12.4	23.6
Total LMW PAHs - 1/2MDL	53.7	35.8%	34.5	72.9
Total LMW PAHs - MDL	53.7	35.8%	34.5	72.9
Total LMW PAHs - Zero	53.7	35.9%	34.4	73.0
Benzo(A)Pyrene	11.0	36.1%	7.02	15.0
Benzo(A)Anthracene	14.0	32.0%	9.51	18.5
Benzo(B)Fluoranthene	18.0	29.8%	12.6	23.4
Benzo(G,H,I)Perylene	8.90	30.8%	6.16	11.6
Benzo(K)Fluoranthene	7.80	31.3%	5.36	10.2
Chrysene	20.0	35.9%	12.8	27.2
Dibenz(A,H)Anthracene	2.50	39.8%	1.50	3.50
Indeno(1,2,3-C,D)Pyrene	7.40	31.1%	5.10	9.70
Pyrene	22.0	39.3%	13.3	30.7
Total HMW PAHs - 1/2MDL	112	26.8%	81.7	142
Total HMW PAHs - MDL	112	26.8%	81.7	142
Total HMW PAHs - Zero	112	26.8%	81.7	142
Total PAHs - 1/2MDL	147	29.6%	103	190
Total PAHs - MDL	147	29.5%	103	190
Total PAHs - Zero	147	29.6%	103	190
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.018	--	0.018	0.018
1,4-Dioxane (P-Dioxane)	0.13	--	0.13	0.13
2,3,4,6-Tetrachlorophenol	0.18	--	0.18	0.18
2,4,5-Trichlorophenol	0.030	--	0.030	0.030
2,4,6-Trichlorophenol	0.023	--	0.023	0.023
2,4-Dichlorophenol	0.033	--	0.033	0.033
2,4-Dimethylphenol	0.026	--	0.026	0.026

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-005			
	0.00-0.50			
	CFISS-05-SO-0-0.5			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.15	--	1.15	1.15
2,4-Dinitrotoluene	0.021	--	0.021	0.021
2,6-Dinitrotoluene	0.026	--	0.026	0.026
2-Chloronaphthalene	0.020	--	0.020	0.020
2-Chlorophenol	0.020	--	0.020	0.020
2-Methylphenol (O-Cresol)	0.12	--	0.12	0.12
2-Nitroaniline	0.19	--	0.19	0.19
2-Nitrophenol	0.024	--	0.024	0.024
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.40	--	0.40	0.40
3-Nitroaniline	0.11	--	0.11	0.11
4,6-Dinitro-2-Methylphenol	0.75	--	0.75	0.75
4-Bromophenyl Phenyl Ether	0.030	--	0.030	0.030
4-Chloro-3-Methylphenol	0.020	--	0.020	0.020
4-Chloroaniline	0.014	--	0.014	0.014
4-Chlorophenyl Phenyl Ether	0.026	--	0.026	0.026
4-Nitroaniline	0.021	--	0.021	0.021
4-Nitrophenol	0.30	--	0.30	0.30
Acetophenone	0.023	44.4%	0.013	0.033
Atrazine	0.19	--	0.19	0.19
Benzaldehyde	0.050	--	0.050	0.050
Benzyl Butyl Phthalate	0.29	--	0.29	0.29
Biphenyl (Diphenyl)	0.16	49.7%	0.080	0.24
Bis(2-Chloroethoxy) Methane	0.020	--	0.020	0.020
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.016	--	0.016	0.016
Bis(2-Chloroisopropyl) Ether	0.031	--	0.031	0.031
Bis(2-Ethylhexyl) Phthalate	0.45	--	0.45	0.45
Caprolactam	0.28	--	0.28	0.28
Carbazole	2.90	30.5%	2.01	3.79
Dibenzofuran	1.40	33.5%	0.93	1.87
Diethyl Phthalate	0.13	--	0.13	0.13
Dimethyl Phthalate	0.016	--	0.016	0.016
Di-N-Butyl Phthalate	0.19	--	0.19	0.19
Di-N-Octylphthalate	0.25	--	0.25	0.25
Hexachlorobenzene	0.030	--	0.030	0.030
Hexachlorobutadiene	0.025	--	0.025	0.025
Hexachlorocyclopentadiene	0.022	--	0.022	0.022
Hexachloroethane	0.022	--	0.022	0.022
Isophorone	0.022	--	0.022	0.022
Nitrobenzene	0.16	--	0.16	0.16
N-Nitrosodi-N-Propylamine	0.029	--	0.029	0.029
N-Nitrosodiphenylamine	0.14	--	0.14	0.14
Pentachlorophenol	0.70	--	0.70	0.70
Phenol	0.13	--	0.13	0.13

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-005			
	0.50-2.00			
	CFISS-05-SO-0.5-2			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	18,400	4.58%	17,558	19,242
Antimony	0.085	70.4%	0.025	0.14
Arsenic	5.60	7.46%	5.18	6.02
Barium	115	9.24%	104	126
Beryllium	0.63	4.90%	0.60	0.66
Cadmium	0.084	6.03%	0.079	0.089
Chromium, Total	14.7	7.75%	13.6	15.8
Chromium, Hexavalent	0.39	7.75%	0.36	0.42
Chromium, Trivalent	14.3	7.75%	13.2	15.4
Cobalt	6.20	1.99%	6.08	6.32
Copper	16.6	4.63%	15.8	17.4
Iron	18,500	2.40%	18,056	18,944
Lead	13.9	3.33%	13.4	14.4
Manganese	524	7.15%	487	561
Mercury	0.033	27.4%	0.024	0.042
Nickel	14.3	6.58%	13.4	15.2
Selenium	0.56	19.1%	0.45	0.67
Silver	0.048	9.83%	0.043	0.053
Thallium	0.12	6.56%	0.11	0.13
Vanadium	13.8	3.31%	13.3	14.3
Zinc	52.6	5.42%	49.7	55.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.45	32.7%	0.30	0.60
Fluoride	72.5	28.8%	51.6	93.4
Essential Nutrients (mg/kg)				
Calcium	4,590	15.1%	3,895	5,285
Magnesium	11,700	2.18%	11,445	11,955
Potassium	1,260	6.91%	1,173	1,347
Sodium	144	21.1%	114	174
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-005			
	0.50-2.00			
	CFISS-05-SO-0.5-2			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	3.50	47.7%	1.83	5.17
Acenaphthene	16.0	80.9%	3.05	29.0
Acenaphthylene	0.037	62.8%	0.014	0.060
Anthracene	19.0	82.4%	3.35	34.7
Fluoranthene	62.0	71.4%	17.7	106
Fluorene	16.0	74.2%	4.13	27.9
Naphthalene	5.40	28.9%	3.84	6.96
Phenanthrene	88.0	78.1%	19.3	157
Total LMW PAHs - 1/2MDL	210	74.3%	54.0	366
Total LMW PAHs - MDL	210	74.3%	54.0	366
Total LMW PAHs - Zero	210	74.3%	54.0	366
Benzo(A)Pyrene	35.0	67.2%	11.5	58.5
Benzo(A)Anthracene	34.0	68.8%	10.6	57.4
Benzo(B)Fluoranthene	41.0	60.1%	16.4	65.6
Benzo(G,H,I)Perylene	25.0	60.8%	9.80	40.2
Benzo(K)Fluoranthene	15.0	64.5%	5.32	24.7
Chrysene	42.0	62.9%	15.6	68.4
Dibenz(A,H)Anthracene	7.30	63.9%	2.64	12.0
Indeno(1,2,3-C,D)Pyrene	20.0	62.0%	7.59	32.4
Pyrene	61.0	72.7%	16.6	105
Total HMW PAHs - 1/2MDL	280	64.7%	98.9	462
Total HMW PAHs - MDL	280	64.7%	98.9	462
Total HMW PAHs - Zero	280	64.7%	98.9	462
Total PAHs - 1/2MDL	446	68.3%	141	750
Total PAHs - MDL	446	68.3%	141	750
Total PAHs - Zero	446	68.3%	141	750
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.037	--	0.037	0.037
1,4-Dioxane (P-Dioxane)	0.27	--	0.27	0.27
2,3,4,6-Tetrachlorophenol	0.36	--	0.36	0.36
2,4,5-Trichlorophenol	0.060	--	0.060	0.060
2,4,6-Trichlorophenol	0.047	--	0.047	0.047
2,4-Dichlorophenol	0.065	--	0.065	0.065
2,4-Dimethylphenol	0.055	--	0.055	0.055

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-005			
	0.50-2.00			
	CFISS-05-SO-0.5-2			
	5/22/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	2.30	--	2.30	2.30
2,4-Dinitrotoluene	0.042	--	0.042	0.042
2,6-Dinitrotoluene	0.050	--	0.050	0.050
2-Chloronaphthalene	0.039	--	0.039	0.039
2-Chlorophenol	0.040	--	0.040	0.040
2-Methylphenol (O-Cresol)	0.25	--	0.25	0.25
2-Nitroaniline	0.39	--	0.39	0.39
2-Nitrophenol	0.049	--	0.049	0.049
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.80	--	0.80	0.80
3-Nitroaniline	0.22	--	0.22	0.22
4,6-Dinitro-2-Methylphenol	1.45	--	1.45	1.45
4-Bromophenyl Phenyl Ether	0.060	--	0.060	0.060
4-Chloro-3-Methylphenol	0.040	--	0.040	0.040
4-Chloroaniline	0.028	--	0.028	0.028
4-Chlorophenyl Phenyl Ether	0.050	--	0.050	0.050
4-Nitroaniline	0.041	--	0.041	0.041
4-Nitrophenol	0.60	--	0.60	0.60
Acetophenone	0.046	41.1%	0.027	0.065
Atrazine	0.37	--	0.37	0.37
Benzaldehyde	0.11	--	0.11	0.11
Benzyl Butyl Phthalate	0.60	32.7%	0.40	0.80
Biphenyl (Diphenyl)	0.87	98.2%	0.016	1.72
Bis(2-Chloroethoxy) Methane	0.041	--	0.041	0.041
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.031	--	0.031	0.031
Bis(2-Chloroisopropyl) Ether	0.065	--	0.065	0.065
Bis(2-Ethylhexyl) Phthalate	0.90	--	0.90	0.90
Caprolactam	0.55	--	0.55	0.55
Carbazole	13.0	76.1%	3.11	22.9
Dibenzofuran	8.80	70.0%	2.64	15.0
Diethyl Phthalate	0.26	--	0.26	0.26
Dimethyl Phthalate	0.031	--	0.031	0.031
Di-N-Butyl Phthalate	0.37	--	0.37	0.37
Di-N-Octylphthalate	0.50	--	0.50	0.50
Hexachlorobenzene	0.060	--	0.060	0.060
Hexachlorobutadiene	0.050	--	0.050	0.050
Hexachlorocyclopentadiene	0.043	--	0.043	0.043
Hexachloroethane	0.044	--	0.044	0.044
Isophorone	0.043	32.5%	0.029	0.057
Nitrobenzene	0.31	--	0.31	0.31
N-Nitrosodi-N-Propylamine	0.055	--	0.055	0.055
N-Nitrosodiphenylamine	0.28	--	0.28	0.28
Pentachlorophenol	1.35	--	1.35	1.35
Phenol	0.26	--	0.26	0.26

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-006			
	0.00-0.50			
	CFISS-006-SO-0-0.5			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,300	4.68%	16,490	18,110
Antimony	0.23	28.1%	0.17	0.29
Arsenic	4.90	13.8%	4.22	5.58
Barium	136	4.03%	131	141
Beryllium	0.80	6.32%	0.75	0.85
Cadmium	0.22	15.0%	0.19	0.25
Chromium, Total	16.7	10.6%	14.9	18.5
Chromium, Hexavalent	0.45	10.6%	0.40	0.49
Chromium, Trivalent	16.3	10.6%	14.5	18.0
Cobalt	6.10	3.51%	5.89	6.31
Copper	38.8	12.3%	34.0	43.6
Iron	15,000	3.40%	14,490	15,510
Lead	406	48.5%	209	603
Manganese	498	5.63%	470	526
Mercury	0.038	54.9%	0.017	0.059
Nickel	30.9	14.5%	26.4	35.4
Selenium	0.75	20.0%	0.60	0.90
Silver	0.089	9.03%	0.081	0.097
Thallium	0.12	14.4%	0.10	0.14
Vanadium	17.4	9.21%	15.8	19.0
Zinc	66.1	12.7%	57.7	74.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	40.2%	0.090	0.21
Fluoride	70.2	20.5%	55.8	84.6
Essential Nutrients (mg/kg)				
Calcium	20,900	10.7%	18,671	23,129
Magnesium	10,000	2.82%	9,718	10,282
Potassium	1,400	6.24%	1,313	1,487
Sodium	120	30.7%	83.1	157
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-006			
	0.00-0.50			
	CFISS-006-SO-0-0.5			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.018	47.1%	0.010	0.026
Acenaphthene	0.14	42.0%	0.081	0.20
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.53	37.7%	0.33	0.73
Fluoranthene	3.60	37.3%	2.26	4.94
Fluorene	0.17	34.6%	0.11	0.23
Naphthalene	0.037	44.9%	0.020	0.054
Phenanthrene	2.20	31.0%	1.52	2.88
Total LMW PAHs - 1/2MDL	6.70	35.8%	4.30	9.10
Total LMW PAHs - MDL	6.70	35.8%	4.31	9.10
Total LMW PAHs - Zero	6.70	35.9%	4.29	9.10
Benzo(A)Pyrene	2.00	36.1%	1.28	2.72
Benzo(A)Anthracene	1.70	32.0%	1.16	2.24
Benzo(B)Fluoranthene	2.60	29.8%	1.82	3.38
Benzo(G,H,I)Perylene	1.80	30.8%	1.25	2.35
Benzo(K)Fluoranthene	0.85	31.3%	0.58	1.12
Chrysene	1.90	35.9%	1.22	2.58
Dibenz(A,H)Anthracene	0.46	39.8%	0.28	0.64
Indeno(1,2,3-C,D)Pyrene	1.90	31.1%	1.31	2.49
Pyrene	3.20	39.3%	1.94	4.46
Total HMW PAHs - 1/2MDL	16.4	26.8%	12.0	20.8
Total HMW PAHs - MDL	16.4	26.8%	12.0	20.8
Total HMW PAHs - Zero	16.4	26.8%	12.0	20.8
Total PAHs - 1/2MDL	20.5	29.6%	14.4	26.5
Total PAHs - MDL	20.5	29.5%	14.4	26.6
Total PAHs - Zero	20.5	29.6%	14.4	26.5
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-006			
	0.00-0.50			
	CFISS-006-SO-0-0.5			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.015	49.7%	0.007	0.022
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.31	30.5%	0.22	0.40
Dibenzofuran	0.10	33.5%	0.066	0.13
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-006			
	0.50-2.00			
	CFISS-006-SO-0.5-2			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,100	4.58%	14,409	15,791
Antimony	1.90	70.4%	0.56	3.24
Arsenic	4.70	7.46%	4.35	5.05
Barium	162	9.24%	147	177
Beryllium	0.67	4.90%	0.64	0.70
Cadmium	0.11	6.03%	0.10	0.12
Chromium, Total	17.9	7.75%	16.5	19.3
Chromium, Hexavalent	0.48	7.75%	0.44	0.52
Chromium, Trivalent	17.4	7.75%	16.1	18.8
Cobalt	5.90	1.99%	5.78	6.02
Copper	721	4.63%	688	754
Iron	15,900	2.40%	15,518	16,282
Lead	28.3	3.33%	27.4	29.2
Manganese	562	7.15%	522	602
Mercury	0.025	27.4%	0.018	0.032
Nickel	15.1	6.58%	14.1	16.1
Selenium	0.82	19.1%	0.66	0.98
Silver	0.086	9.83%	0.078	0.094
Thallium	0.11	6.56%	0.10	0.12
Vanadium	12.5	3.31%	12.1	12.9
Zinc	214	5.42%	202	226
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	32.7%	0.10	0.20
Fluoride	85.4	28.8%	60.8	110
Essential Nutrients (mg/kg)				
Calcium	10,600	15.1%	8,995	12,205
Magnesium	9,580	2.18%	9,371	9,789
Potassium	1,050	6.91%	977	1,123
Sodium	74.4	21.1%	58.7	90.1
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-006			
	0.50-2.00			
	CFISS-006-SO-0.5-2			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.067	47.7%	0.035	0.099
Acenaphthene	0.63	80.9%	0.12	1.14
Acenaphthylene	0.021	62.8%	0.008	0.034
Anthracene	2.00	82.4%	0.35	3.65
Fluoranthene	10.0	71.4%	2.86	17.1
Fluorene	0.68	74.2%	0.18	1.18
Naphthalene	0.18	28.9%	0.13	0.23
Phenanthrene	8.30	78.1%	1.82	14.8
Total LMW PAHs - 1/2MDL	21.9	74.3%	5.63	38.1
Total LMW PAHs - MDL	21.9	74.3%	5.64	38.2
Total LMW PAHs - Zero	21.9	74.3%	5.62	38.1
Benzo(A)Pyrene	6.50	67.2%	2.13	10.9
Benzo(A)Anthracene	5.90	68.8%	1.84	9.96
Benzo(B)Fluoranthene	7.90	60.1%	3.16	12.6
Benzo(G,H,I)Perylene	6.10	60.8%	2.39	9.81
Benzo(K)Fluoranthene	2.80	64.5%	0.99	4.61
Chrysene	6.50	62.9%	2.41	10.6
Dibenz(A,H)Anthracene	1.60	63.9%	0.58	2.62
Indeno(1,2,3-C,D)Pyrene	6.40	62.0%	2.43	10.4
Pyrene	12.0	72.7%	3.27	20.7
Total HMW PAHs - 1/2MDL	55.7	64.7%	19.7	91.7
Total HMW PAHs - MDL	55.7	64.7%	19.7	91.7
Total HMW PAHs - Zero	55.7	64.7%	19.7	91.7
Total PAHs - 1/2MDL	69.6	68.3%	22.0	117
Total PAHs - MDL	69.6	68.3%	22.1	117
Total PAHs - Zero	69.6	68.3%	22.0	117
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.060	--	0.060	0.060
1,4-Dioxane (P-Dioxane)	0.22	--	0.22	0.22
2,3,4,6-Tetrachlorophenol	0.075	--	0.075	0.075
2,4,5-Trichlorophenol	0.080	--	0.080	0.080
2,4,6-Trichlorophenol	0.024	--	0.024	0.024
2,4-Dichlorophenol	0.020	--	0.020	0.020
2,4-Dimethylphenol	0.18	--	0.18	0.18

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-006			
	0.50-2.00			
	CFISS-006-SO-0.5-2			
	7/19/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.60	--	0.60	0.60
2,4-Dinitrotoluene	0.033	--	0.033	0.033
2,6-Dinitrotoluene	0.044	--	0.044	0.044
2-Chloronaphthalene	0.019	--	0.019	0.019
2-Chlorophenol	0.021	--	0.021	0.021
2-Methylphenol (O-Cresol)	0.036	--	0.036	0.036
2-Nitroaniline	0.027	--	0.027	0.027
2-Nitrophenol	0.028	--	0.028	0.028
3- And 4- Methylphenol (Total)	0.022	--	0.022	0.022
3,3'-Dichlorobenzidine	0.090	--	0.090	0.090
3-Nitroaniline	0.025	--	0.025	0.025
4,6-Dinitro-2-Methylphenol	0.22	--	0.22	0.22
4-Bromophenyl Phenyl Ether	0.026	--	0.026	0.026
4-Chloro-3-Methylphenol	0.036	--	0.036	0.036
4-Chloroaniline	0.021	--	0.021	0.021
4-Chlorophenyl Phenyl Ether	0.025	--	0.025	0.025
4-Nitroaniline	0.031	--	0.031	0.031
4-Nitrophenol	0.40	--	0.40	0.40
Acetophenone	0.018	41.1%	0.011	0.025
Atrazine	0.037	--	0.037	0.037
Benzaldehyde	0.065	--	0.065	0.065
Benzyl Butyl Phthalate	0.026	32.7%	0.017	0.034
Biphenyl (Diphenyl)	0.070	98.2%	0.001	0.14
Bis(2-Chloroethoxy) Methane	0.026	--	0.026	0.026
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.020	--	0.020	0.020
Bis(2-Chloroisopropyl) Ether	0.034	--	0.034	0.034
Bis(2-Ethylhexyl) Phthalate	0.032	--	0.032	0.032
Caprolactam	0.060	--	0.060	0.060
Carbazole	1.00	76.1%	0.24	1.76
Dibenzofuran	0.45	70.0%	0.13	0.77
Diethyl Phthalate	0.024	--	0.024	0.024
Dimethyl Phthalate	0.024	--	0.024	0.024
Di-N-Butyl Phthalate	0.025	--	0.025	0.025
Di-N-Octylphthalate	0.042	--	0.042	0.042
Hexachlorobenzene	0.034	--	0.034	0.034
Hexachlorobutadiene	0.023	--	0.023	0.023
Hexachlorocyclopentadiene	0.050	--	0.050	0.050
Hexachloroethane	0.030	--	0.030	0.030
Isophorone	0.018	32.5%	0.012	0.023
Nitrobenzene	0.026	--	0.026	0.026
N-Nitrosodi-N-Propylamine	0.028	--	0.028	0.028
N-Nitrosodiphenylamine	0.075	--	0.075	0.075
Pentachlorophenol	0.10	--	0.10	0.10
Phenol	0.027	--	0.027	0.027

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-007			
	0.00-0.50			
	CFISS-07-SO-0-0.5			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	27,600	4.68%	26,308	28,892
Antimony	0.46	28.1%	0.33	0.59
Arsenic	7.50	13.8%	6.46	8.54
Barium	131	4.03%	126	136
Beryllium	1.40	6.32%	1.31	1.49
Cadmium	0.28	15.0%	0.24	0.32
Chromium, Total	36.8	10.6%	32.9	40.7
Chromium, Hexavalent	0.98	10.6%	0.88	1.09
Chromium, Trivalent	35.8	10.6%	32.0	39.6
Cobalt	6.80	3.51%	6.56	7.04
Copper	68.8	12.3%	60.4	77.2
Iron	26,700	3.40%	25,792	27,608
Lead	24.5	48.5%	12.6	36.4
Manganese	519	5.63%	490	548
Mercury	0.029	54.9%	0.013	0.045
Nickel	37.6	14.5%	32.2	43.0
Selenium	0.47	20.0%	0.38	0.56
Silver	0.074	9.03%	0.067	0.081
Thallium	0.12	14.4%	0.10	0.14
Vanadium	24.4	9.21%	22.2	26.6
Zinc	66.5	12.7%	58.0	75.0
Other Inorganic Parameters (mg/kg)				
Cyanide	0.31	40.2%	0.19	0.43
Fluoride	714	20.5%	567	861
Essential Nutrients (mg/kg)				
Calcium	17,400	10.7%	15,544	19,256
Magnesium	11,000	2.82%	10,690	11,310
Potassium	2,220	6.24%	2,081	2,359
Sodium	2,340	30.7%	1,621	3,059
Pesticides (mg/kg)				
Aldrin	5.50E-04	--	5.50E-04	5.50E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Alpha Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.95E-04	--	3.95E-04	3.95E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.15E-04	--	2.15E-04	2.15E-04
Dieldrin	4.60E-04	--	4.60E-04	4.60E-04
Endosulfan Sulfate	4.45E-04	--	4.45E-04	4.45E-04
Endrin	5.00E-04	--	5.00E-04	5.00E-04
Endrin Aldehyde	8.50E-04	--	8.50E-04	8.50E-04
Endrin Ketone	7.00E-04	--	7.00E-04	7.00E-04
Gamma Bhc (Lindane)	3.25E-04	--	3.25E-04	3.25E-04
Heptachlor	4.15E-04	--	4.15E-04	4.15E-04
Heptachlor Epoxide	5.50E-04	--	5.50E-04	5.50E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.15E-04	--	4.15E-04	4.15E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-007			
	0.00-0.50			
	CFISS-07-SO-0-0.5			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.046	140%	-1.82E-02	0.11
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.046	140%	-1.82E-02	0.11
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.078	47.1%	0.041	0.11
Acenaphthene	0.39	42.0%	0.23	0.55
Acenaphthylene	0.022	36.1%	0.014	0.030
Anthracene	0.72	37.7%	0.45	0.99
Fluoranthene	5.00	37.3%	3.13	6.87
Fluorene	0.32	34.6%	0.21	0.43
Naphthalene	0.16	44.9%	0.088	0.23
Phenanthrene	3.40	31.0%	2.34	4.46
Total LMW PAHs - 1/2MDL	10.1	35.8%	6.47	13.7
Total LMW PAHs - MDL	10.1	35.8%	6.48	13.7
Total LMW PAHs - Zero	10.1	35.9%	6.47	13.7
Benzo(A)Pyrene	3.40	36.1%	2.17	4.63
Benzo(A)Anthracene	2.80	32.0%	1.90	3.70
Benzo(B)Fluoranthene	4.00	29.8%	2.81	5.19
Benzo(G,H,I)Perylene	3.40	30.8%	2.35	4.45
Benzo(K)Fluoranthene	1.60	31.3%	1.10	2.10
Chrysene	3.80	35.9%	2.44	5.16
Dibenz(A,H)Anthracene	0.87	39.8%	0.52	1.22
Indeno(1,2,3-C,D)Pyrene	2.60	31.1%	1.79	3.41
Pyrene	5.00	39.3%	3.03	6.97
Total HMW PAHs - 1/2MDL	27.5	26.8%	20.1	34.8
Total HMW PAHs - MDL	27.5	26.8%	20.1	34.8
Total HMW PAHs - Zero	27.5	26.8%	20.1	34.8
Total PAHs - 1/2MDL	33.5	29.6%	23.6	43.4
Total PAHs - MDL	33.5	29.5%	23.6	43.4
Total PAHs - Zero	33.5	29.6%	23.6	43.4
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.008	--	0.008	0.008
1,4-Dioxane (P-Dioxane)	0.055	--	0.055	0.055
2,3,4,6-Tetrachlorophenol	0.075	--	0.075	0.075
2,4,5-Trichlorophenol	0.013	--	0.013	0.013
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.014	--	0.014	0.014
2,4-Dimethylphenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-007			
	0.00-0.50			
	CFISS-07-SO-0-0.5			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.48	--	0.48	0.48
2,4-Dinitrotoluene	0.009	--	0.009	0.009
2,6-Dinitrotoluene	0.011	--	0.011	0.011
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.008	--	0.008	0.008
2-Methylphenol (O-Cresol)	0.050	--	0.050	0.050
2-Nitroaniline	0.080	--	0.080	0.080
2-Nitrophenol	0.010	--	0.010	0.010
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.17	--	0.17	0.17
3-Nitroaniline	0.045	--	0.045	0.045
4,6-Dinitro-2-Methylphenol	0.31	--	0.31	0.31
4-Bromophenyl Phenyl Ether	0.013	--	0.013	0.013
4-Chloro-3-Methylphenol	0.009	--	0.009	0.009
4-Chloroaniline	0.006	--	0.006	0.006
4-Chlorophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Nitroaniline	0.009	--	0.009	0.009
4-Nitrophenol	0.13	--	0.13	0.13
Acetophenone	0.010	44.4%	0.005	0.014
Atrazine	0.075	--	0.075	0.075
Benzaldehyde	0.022	--	0.022	0.022
Benzyl Butyl Phthalate	0.12	--	0.12	0.12
Biphenyl (Diphenyl)	0.024	49.7%	0.012	0.036
Bis(2-Chloroethoxy) Methane	0.009	--	0.009	0.009
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.007	--	0.007	0.007
Bis(2-Chloroisopropyl) Ether	0.013	--	0.013	0.013
Bis(2-Ethylhexyl) Phthalate	0.19	--	0.19	0.19
Caprolactam	0.12	--	0.12	0.12
Carbazole	0.58	30.5%	0.40	0.76
Dibenzofuran	0.21	33.5%	0.14	0.28
Diethyl Phthalate	0.055	--	0.055	0.055
Dimethyl Phthalate	0.007	--	0.007	0.007
Di-N-Butyl Phthalate	0.075	--	0.075	0.075
Di-N-Octylphthalate	0.11	--	0.11	0.11
Hexachlorobenzene	0.013	--	0.013	0.013
Hexachlorobutadiene	0.011	--	0.011	0.011
Hexachlorocyclopentadiene	0.009	--	0.009	0.009
Hexachloroethane	0.009	--	0.009	0.009
Isophorone	0.009	--	0.009	0.009
Nitrobenzene	0.065	--	0.065	0.065
N-Nitrosodi-N-Propylamine	0.012	--	0.012	0.012
N-Nitrosodiphenylamine	0.060	--	0.060	0.060
Pentachlorophenol	0.29	--	0.29	0.29
Phenol	0.055	--	0.055	0.055

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-007			
	0.50-2.00			
	CFISS-07-SO-0.5-2			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,000	4.58%	14,314	15,686
Antimony	0.085	70.4%	0.025	0.14
Arsenic	4.50	7.46%	4.16	4.84
Barium	136	9.24%	123	149
Beryllium	0.68	4.90%	0.65	0.71
Cadmium	0.14	6.03%	0.13	0.15
Chromium, Total	19.9	7.75%	18.4	21.4
Chromium, Hexavalent	0.53	7.75%	0.49	0.57
Chromium, Trivalent	19.4	7.75%	17.9	20.9
Cobalt	6.00	1.99%	5.88	6.12
Copper	22.2	4.63%	21.2	23.2
Iron	16,800	2.40%	16,397	17,203
Lead	13.6	3.33%	13.1	14.1
Manganese	545	7.15%	506	584
Mercury	0.025	27.4%	0.018	0.032
Nickel	16.9	6.58%	15.8	18.0
Selenium	0.19	19.1%	0.15	0.23
Silver	0.061	9.83%	0.055	0.067
Thallium	0.080	6.56%	0.075	0.085
Vanadium	13.6	3.31%	13.1	14.1
Zinc	92.7	5.42%	87.7	97.7
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	32.7%	0.10	0.20
Fluoride	196	28.8%	140	252
Essential Nutrients (mg/kg)				
Calcium	18,700	15.1%	15,869	21,531
Magnesium	10,400	2.18%	10,173	10,627
Potassium	1,110	6.91%	1,033	1,187
Sodium	135	21.1%	107	163
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-007			
	0.50-2.00			
	CFISS-07-SO-0.5-2			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.58	29.2%	0.41	0.75
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.58	29.2%	0.41	0.75
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.092	47.7%	0.048	0.14
Acenaphthene	0.52	80.9%	0.099	0.94
Acenaphthylene	0.018	62.8%	0.007	0.029
Anthracene	1.20	82.4%	0.21	2.19
Fluoranthene	5.90	71.4%	1.69	10.1
Fluorene	0.45	74.2%	0.12	0.78
Naphthalene	0.19	28.9%	0.14	0.24
Phenanthrene	4.70	78.1%	1.03	8.37
Total LMW PAHs - 1/2MDL	13.1	74.3%	3.36	22.8
Total LMW PAHs - MDL	13.1	74.3%	3.36	22.8
Total LMW PAHs - Zero	13.1	74.3%	3.36	22.8
Benzo(A)Pyrene	2.80	67.2%	0.92	4.68
Benzo(A)Anthracene	2.90	68.8%	0.91	4.89
Benzo(B)Fluoranthene	2.90	60.1%	1.16	4.64
Benzo(G,H,I)Perylene	2.20	60.8%	0.86	3.54
Benzo(K)Fluoranthene	1.40	64.5%	0.50	2.30
Chrysene	3.20	62.9%	1.19	5.21
Dibenz(A,H)Anthracene	0.47	63.9%	0.17	0.77
Indeno(1,2,3-C,D)Pyrene	1.80	62.0%	0.68	2.92
Pyrene	5.20	72.7%	1.42	8.98
Total HMW PAHs - 1/2MDL	22.9	64.7%	8.07	37.7
Total HMW PAHs - MDL	22.9	64.7%	8.07	37.7
Total HMW PAHs - Zero	22.9	64.7%	8.07	37.7
Total PAHs - 1/2MDL	32.9	68.3%	10.4	55.5
Total PAHs - MDL	32.9	68.3%	10.4	55.5
Total PAHs - Zero	32.9	68.3%	10.4	55.5
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.004	--	0.004	0.004
1,4-Dioxane (P-Dioxane)	0.027	--	0.027	0.027
2,3,4,6-Tetrachlorophenol	0.037	--	0.037	0.037
2,4,5-Trichlorophenol	0.006	--	0.006	0.006
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.007	--	0.007	0.007
2,4-Dimethylphenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-007			
	0.50-2.00			
	CFISS-07-SO-0.5-2			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.24	--	0.24	0.24
2,4-Dinitrotoluene	0.004	--	0.004	0.004
2,6-Dinitrotoluene	0.006	--	0.006	0.006
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.025	--	0.025	0.025
2-Nitroaniline	0.040	--	0.040	0.040
2-Nitrophenol	0.005	--	0.005	0.005
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.080	--	0.080	0.080
3-Nitroaniline	0.022	--	0.022	0.022
4,6-Dinitro-2-Methylphenol	0.15	--	0.15	0.15
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.004	--	0.004	0.004
4-Chloroaniline	0.003	--	0.003	0.003
4-Chlorophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Nitroaniline	0.004	--	0.004	0.004
4-Nitrophenol	0.060	--	0.060	0.060
Acetophenone	0.005	41.1%	0.003	0.007
Atrazine	0.038	--	0.038	0.038
Benzaldehyde	0.011	--	0.011	0.011
Benzyl Butyl Phthalate	0.060	32.7%	0.040	0.080
Biphenyl (Diphenyl)	0.029	98.2%	5.22E-04	0.057
Bis(2-Chloroethoxy) Methane	0.004	--	0.004	0.004
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.003	--	0.003	0.003
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.095	--	0.095	0.095
Caprolactam	0.055	--	0.055	0.055
Carbazole	0.74	76.1%	0.18	1.30
Dibenzofuran	0.28	70.0%	0.084	0.48
Diethyl Phthalate	0.026	--	0.026	0.026
Dimethyl Phthalate	0.003	--	0.003	0.003
Di-N-Butyl Phthalate	0.038	--	0.038	0.038
Di-N-Octylphthalate	0.050	--	0.050	0.050
Hexachlorobenzene	0.006	--	0.006	0.006
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.004	--	0.004	0.004
Hexachloroethane	0.005	--	0.005	0.005
Isophorone	0.004	32.5%	0.003	0.006
Nitrobenzene	0.032	--	0.032	0.032
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.029	--	0.029	0.029
Pentachlorophenol	0.14	--	0.14	0.14
Phenol	0.027	--	0.027	0.027

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-008			
	0.00-0.50			
	CFISS-008-SO-0-0.5			
	7/26/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	32,700	4.68%	31,169	34,231
Antimony	0.24	28.1%	0.17	0.31
Arsenic	6.00	13.8%	5.17	6.83
Barium	120	4.03%	115	125
Beryllium	0.92	6.32%	0.86	0.98
Cadmium	0.27	15.0%	0.23	0.31
Chromium, Total	25.2	10.6%	22.5	27.9
Chromium, Hexavalent	0.67	10.6%	0.60	0.75
Chromium, Trivalent	24.5	10.6%	21.9	27.1
Cobalt	6.20	3.51%	5.98	6.42
Copper	21.1	12.3%	18.5	23.7
Iron	16,500	3.40%	15,939	17,061
Lead	16.9	48.5%	8.70	25.1
Manganese	448	5.63%	423	473
Mercury	0.016	54.9%	0.007	0.025
Nickel	39.9	14.5%	34.1	45.7
Selenium	1.50	20.0%	1.20	1.80
Silver	0.052	9.03%	0.047	0.057
Thallium	0.11	14.4%	0.094	0.13
Vanadium	18.9	9.21%	17.2	20.6
Zinc	56.6	12.7%	49.4	63.8
Other Inorganic Parameters (mg/kg)				
Cyanide	0.97	40.2%	0.58	1.36
Fluoride	662	20.5%	526	798
Essential Nutrients (mg/kg)				
Calcium	21,400	10.7%	19,117	23,683
Magnesium	11,100	2.82%	10,787	11,413
Potassium	2,040	6.24%	1,913	2,167
Sodium	3,780	30.7%	2,618	4,942
Pesticides (mg/kg)				
Aldrin	4.10E-04	--	4.10E-04	4.10E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.10E-04	--	3.10E-04	3.10E-04
Alpha Endosulfan	4.70E-04	--	4.70E-04	4.70E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.30E-04	--	3.30E-04	3.30E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.70E-04	--	3.70E-04	3.70E-04
Dieldrin	4.40E-04	--	4.40E-04	4.40E-04
Endosulfan Sulfate	3.95E-04	--	3.95E-04	3.95E-04
Endrin	4.30E-04	--	4.30E-04	4.30E-04
Endrin Aldehyde	4.20E-04	--	4.20E-04	4.20E-04
Endrin Ketone	4.70E-04	--	4.70E-04	4.70E-04
Gamma Bhc (Lindane)	3.05E-04	--	3.05E-04	3.05E-04
Heptachlor	4.35E-04	--	4.35E-04	4.35E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.45E-04	--	4.45E-04	4.45E-04
P,P'-DDE	4.90E-04	--	4.90E-04	4.90E-04
P,P'-DDT	3.50E-04	--	3.50E-04	3.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-008			
	0.00-0.50			
	CFISS-008-SO-0-0.5			
	7/26/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	140%	-1.84E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.84E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.008	47.1%	0.004	0.012
Acenaphthene	0.067	42.0%	0.039	0.095
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.089	37.7%	0.055	0.12
Fluoranthene	0.66	37.3%	0.41	0.91
Fluorene	0.048	34.6%	0.031	0.065
Naphthalene	0.014	44.9%	0.008	0.020
Phenanthrene	0.47	31.0%	0.32	0.62
Total LMW PAHs - 1/2MDL	1.36	35.8%	0.87	1.85
Total LMW PAHs - MDL	1.36	35.8%	0.88	1.85
Total LMW PAHs - Zero	1.36	35.9%	0.87	1.84
Benzo(A)Pyrene	0.38	36.1%	0.24	0.52
Benzo(A)Anthracene	0.32	32.0%	0.22	0.42
Benzo(B)Fluoranthene	0.53	29.8%	0.37	0.69
Benzo(G,H,I)Perylene	0.36	30.8%	0.25	0.47
Benzo(K)Fluoranthene	0.16	31.3%	0.11	0.21
Chrysene	0.42	35.9%	0.27	0.57
Dibenz(A,H)Anthracene	0.069	39.8%	0.042	0.096
Indeno(1,2,3-C,D)Pyrene	0.41	31.1%	0.28	0.54
Pyrene	0.65	39.3%	0.39	0.91
Total HMW PAHs - 1/2MDL	3.30	26.8%	2.42	4.18
Total HMW PAHs - MDL	3.30	26.8%	2.42	4.18
Total HMW PAHs - Zero	3.30	26.8%	2.42	4.18
Total PAHs - 1/2MDL	4.12	29.6%	2.90	5.34
Total PAHs - MDL	4.13	29.5%	2.91	5.34
Total PAHs - Zero	4.12	29.6%	2.90	5.33
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-008			
	0.00-0.50			
	CFISS-008-SO-0-0.5			
	7/26/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.059	30.5%	0.041	0.077
Dibenzofuran	0.022	33.5%	0.015	0.029
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-008			
	0.50-2.00			
	CFISS-008-SO-0.5-2			
	7/26/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	19,000	4.58%	18,131	19,869
Antimony	0.14	70.4%	0.041	0.24
Arsenic	5.80	7.46%	5.37	6.23
Barium	118	9.24%	107	129
Beryllium	0.80	4.90%	0.76	0.84
Cadmium	0.13	6.03%	0.12	0.14
Chromium, Total	20.0	7.75%	18.5	21.5
Chromium, Hexavalent	0.54	7.75%	0.49	0.58
Chromium, Trivalent	19.5	7.75%	18.0	21.0
Cobalt	6.20	1.99%	6.08	6.32
Copper	17.1	4.63%	16.3	17.9
Iron	16,600	2.40%	16,201	16,999
Lead	13.5	3.33%	13.1	13.9
Manganese	501	7.15%	465	537
Mercury	0.023	27.4%	0.017	0.029
Nickel	21.5	6.58%	20.1	22.9
Selenium	1.60	19.1%	1.29	1.91
Silver	0.042	9.83%	0.038	0.046
Thallium	0.091	6.56%	0.085	0.097
Vanadium	14.4	3.31%	13.9	14.9
Zinc	51.7	5.42%	48.9	54.5
Other Inorganic Parameters (mg/kg)				
Cyanide	1.60	32.7%	1.08	2.12
Fluoride	508	28.8%	362	654
Essential Nutrients (mg/kg)				
Calcium	22,600	15.1%	19,178	26,022
Magnesium	12,700	2.18%	12,423	12,977
Potassium	1,530	6.91%	1,424	1,636
Sodium	1,550	21.1%	1,223	1,877
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-008			
	0.50-2.00			
	CFISS-008-SO-0.5-2			
	7/26/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.008	47.7%	0.004	0.012
Acenaphthene	0.074	80.9%	0.014	0.13
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.094	82.4%	0.017	0.17
Fluoranthene	0.56	71.4%	0.16	0.96
Fluorene	0.054	74.2%	0.014	0.094
Naphthalene	0.016	28.9%	0.011	0.021
Phenanthrene	0.49	78.1%	0.11	0.87
Total LMW PAHs - 1/2MDL	1.30	74.3%	0.33	2.27
Total LMW PAHs - MDL	1.30	74.3%	0.34	2.27
Total LMW PAHs - Zero	1.30	74.3%	0.33	2.26
Benzo(A)Pyrene	0.30	67.2%	0.098	0.50
Benzo(A)Anthracene	0.26	68.8%	0.081	0.44
Benzo(B)Fluoranthene	0.41	60.1%	0.16	0.66
Benzo(G,H,I)Perylene	0.23	60.8%	0.090	0.37
Benzo(K)Fluoranthene	0.18	64.5%	0.064	0.30
Chrysene	0.36	62.9%	0.13	0.59
Dibenz(A,H)Anthracene	0.064	63.9%	0.023	0.10
Indeno(1,2,3-C,D)Pyrene	0.26	62.0%	0.099	0.42
Pyrene	0.64	72.7%	0.17	1.11
Total HMW PAHs - 1/2MDL	2.70	64.7%	0.95	4.45
Total HMW PAHs - MDL	2.70	64.7%	0.95	4.45
Total HMW PAHs - Zero	2.70	64.7%	0.95	4.45
Total PAHs - 1/2MDL	3.59	68.3%	1.14	6.04
Total PAHs - MDL	3.59	68.3%	1.14	6.04
Total PAHs - Zero	3.58	68.3%	1.13	6.03
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-008			
	0.50-2.00			
	CFISS-008-SO-0.5-2			
	7/26/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.050	76.1%	0.012	0.088
Dibenzofuran	0.027	70.0%	0.008	0.046
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-009			
	0.00-0.50			
	CFISS-09-SO-0-0.5			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	16,200	4.68%	15,441	16,959
Antimony	0.085	28.1%	0.061	0.11
Arsenic	5.00	13.8%	4.31	5.69
Barium	118	4.03%	113	123
Beryllium	0.59	6.32%	0.55	0.63
Cadmium	0.12	15.0%	0.10	0.14
Chromium, Total	14.6	10.6%	13.1	16.1
Chromium, Hexavalent	0.39	10.6%	0.35	0.43
Chromium, Trivalent	14.2	10.6%	12.7	15.7
Cobalt	6.00	3.51%	5.79	6.21
Copper	15.7	12.3%	13.8	17.6
Iron	17,000	3.40%	16,422	17,578
Lead	12.1	48.5%	6.23	18.0
Manganese	515	5.63%	486	544
Mercury	0.021	54.9%	0.009	0.033
Nickel	17.5	14.5%	15.0	20.0
Selenium	0.41	20.0%	0.33	0.49
Silver	0.038	9.03%	0.035	0.041
Thallium	0.094	14.4%	0.081	0.11
Vanadium	14.3	9.21%	13.0	15.6
Zinc	52.6	12.7%	45.9	59.3
Other Inorganic Parameters (mg/kg)				
Cyanide	0.11	40.2%	0.066	0.15
Fluoride	36.1	20.5%	28.7	43.5
Essential Nutrients (mg/kg)				
Calcium	15,300	10.7%	13,668	16,932
Magnesium	11,400	2.82%	11,079	11,721
Potassium	1,100	6.24%	1,031	1,169
Sodium	35.1	30.7%	24.3	45.8
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.45E-04	--	3.45E-04	3.45E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.80E-04	--	3.80E-04	3.80E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.45E-04	--	4.45E-04	4.45E-04
Endosulfan Sulfate	4.30E-04	--	4.30E-04	4.30E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.05E-04	--	4.05E-04	4.05E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.05E-04	--	4.05E-04	4.05E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-009			
	0.00-0.50			
	CFISS-09-SO-0-0.5			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	140%	-1.86E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.86E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.012	47.1%	0.006	0.018
Acenaphthene	0.063	42.0%	0.037	0.089
Acenaphthylene	0.003	36.1%	0.002	0.004
Anthracene	0.12	37.7%	0.075	0.17
Fluoranthene	0.89	37.3%	0.56	1.22
Fluorene	0.048	34.6%	0.031	0.065
Naphthalene	0.030	44.9%	0.017	0.043
Phenanthrene	0.58	31.0%	0.40	0.76
Total LMW PAHs - 1/2MDL	1.75	35.8%	1.12	2.37
Total LMW PAHs - MDL	1.75	35.8%	1.12	2.37
Total LMW PAHs - Zero	1.75	35.9%	1.12	2.37
Benzo(A)Pyrene	0.55	36.1%	0.35	0.75
Benzo(A)Anthracene	0.53	32.0%	0.36	0.70
Benzo(B)Fluoranthene	0.80	29.8%	0.56	1.04
Benzo(G,H,I)Perylene	0.63	30.8%	0.44	0.82
Benzo(K)Fluoranthene	0.32	31.3%	0.22	0.42
Chrysene	0.77	35.9%	0.49	1.05
Dibenz(A,H)Anthracene	0.13	39.8%	0.078	0.18
Indeno(1,2,3-C,D)Pyrene	0.50	31.1%	0.34	0.66
Pyrene	0.91	39.3%	0.55	1.27
Total HMW PAHs - 1/2MDL	5.14	26.8%	3.76	6.52
Total HMW PAHs - MDL	5.14	26.8%	3.76	6.52
Total HMW PAHs - Zero	5.14	26.8%	3.76	6.52
Total PAHs - 1/2MDL	6.07	29.6%	4.28	7.87
Total PAHs - MDL	6.07	29.5%	4.28	7.87
Total PAHs - Zero	6.07	29.6%	4.28	7.87
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	7.50E-04	--	7.50E-04	7.50E-04
1,4-Dioxane (P-Dioxane)	0.006	--	0.006	0.006
2,3,4,6-Tetrachlorophenol	0.007	--	0.007	0.007
2,4,5-Trichlorophenol	0.001	--	0.001	0.001
2,4,6-Trichlorophenol	9.50E-04	--	9.50E-04	9.50E-04
2,4-Dichlorophenol	0.001	--	0.001	0.001
2,4-Dimethylphenol	0.001	--	0.001	0.001

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-009			
	0.00-0.50			
	CFISS-09-SO-0-0.5			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.046	--	0.046	0.046
2,4-Dinitrotoluene	8.50E-04	--	8.50E-04	8.50E-04
2,6-Dinitrotoluene	0.001	--	0.001	0.001
2-Chloronaphthalene	8.00E-04	--	8.00E-04	8.00E-04
2-Chlorophenol	8.00E-04	--	8.00E-04	8.00E-04
2-Methylphenol (O-Cresol)	0.005	--	0.005	0.005
2-Nitroaniline	0.008	--	0.008	0.008
2-Nitrophenol	0.001	--	0.001	0.001
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.016	--	0.016	0.016
3-Nitroaniline	0.004	--	0.004	0.004
4,6-Dinitro-2-Methylphenol	0.030	--	0.030	0.030
4-Bromophenyl Phenyl Ether	0.001	--	0.001	0.001
4-Chloro-3-Methylphenol	8.00E-04	--	8.00E-04	8.00E-04
4-Chloroaniline	5.50E-04	--	5.50E-04	5.50E-04
4-Chlorophenyl Phenyl Ether	0.001	--	0.001	0.001
4-Nitroaniline	8.50E-04	--	8.50E-04	8.50E-04
4-Nitrophenol	0.012	--	0.012	0.012
Acetophenone	0.002	44.4%	0.001	0.003
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.007	--	0.007	0.007
Benzyl Butyl Phthalate	0.012	--	0.012	0.012
Biphenyl (Diphenyl)	0.004	49.7%	0.002	0.006
Bis(2-Chloroethoxy) Methane	8.00E-04	--	8.00E-04	8.00E-04
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	6.00E-04	--	6.00E-04	6.00E-04
Bis(2-Chloroisopropyl) Ether	0.001	--	0.001	0.001
Bis(2-Ethylhexyl) Phthalate	0.018	--	0.018	0.018
Caprolactam	0.011	--	0.011	0.011
Carbazole	0.12	30.5%	0.083	0.16
Dibenzofuran	0.027	33.5%	0.018	0.036
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	6.00E-04	--	6.00E-04	6.00E-04
Di-N-Butyl Phthalate	0.008	--	0.008	0.008
Di-N-Octylphthalate	0.010	--	0.010	0.010
Hexachlorobenzene	0.001	--	0.001	0.001
Hexachlorobutadiene	0.001	--	0.001	0.001
Hexachlorocyclopentadiene	8.50E-04	--	8.50E-04	8.50E-04
Hexachloroethane	9.00E-04	--	9.00E-04	9.00E-04
Isophorone	8.50E-04	--	8.50E-04	8.50E-04
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.001	--	0.001	0.001
N-Nitrosodiphenylamine	0.006	--	0.006	0.006
Pentachlorophenol	0.028	--	0.028	0.028
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-009			
	0.50-2.00			
	CFISS-09-SO-0.5-2			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	18,400	4.58%	17,558	19,242
Antimony	0.085	70.4%	0.025	0.14
Arsenic	6.10	7.46%	5.65	6.55
Barium	113	9.24%	103	123
Beryllium	0.59	4.90%	0.56	0.62
Cadmium	0.067	6.03%	0.063	0.071
Chromium, Total	14.5	7.75%	13.4	15.6
Chromium, Hexavalent	0.39	7.75%	0.36	0.42
Chromium, Trivalent	14.1	7.75%	13.0	15.2
Cobalt	5.90	1.99%	5.78	6.02
Copper	15.2	4.63%	14.5	15.9
Iron	18,700	2.40%	18,251	19,149
Lead	11.2	3.33%	10.8	11.6
Manganese	501	7.15%	465	537
Mercury	0.030	27.4%	0.022	0.038
Nickel	13.8	6.58%	12.9	14.7
Selenium	0.51	19.1%	0.41	0.61
Silver	0.038	9.83%	0.034	0.042
Thallium	0.099	6.56%	0.093	0.11
Vanadium	12.2	3.31%	11.8	12.6
Zinc	50.5	5.42%	47.8	53.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.10	32.7%	0.067	0.13
Fluoride	41.0	28.8%	29.2	52.8
Essential Nutrients (mg/kg)				
Calcium	12,400	15.1%	10,523	14,277
Magnesium	13,300	2.18%	13,010	13,590
Potassium	1,040	6.91%	968	1,112
Sodium	70.6	21.1%	55.7	85.5
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-009			
	0.50-2.00			
	CFISS-09-SO-0.5-2			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.007	47.7%	0.004	0.010
Acenaphthene	0.018	80.9%	0.003	0.033
Acenaphthylene	7.00E-04	62.8%	2.60E-04	0.001
Anthracene	0.030	82.4%	0.005	0.055
Fluoranthene	0.16	71.4%	0.046	0.27
Fluorene	0.015	74.2%	0.004	0.026
Naphthalene	0.014	28.9%	0.010	0.018
Phenanthrene	0.14	78.1%	0.031	0.25
Total LMW PAHs - 1/2MDL	0.38	74.3%	0.099	0.67
Total LMW PAHs - MDL	0.39	74.3%	0.099	0.67
Total LMW PAHs - Zero	0.38	74.3%	0.099	0.67
Benzo(A)Pyrene	0.096	67.2%	0.031	0.16
Benzo(A)Anthracene	0.090	68.8%	0.028	0.15
Benzo(B)Fluoranthene	0.11	60.1%	0.044	0.18
Benzo(G,H,I)Perylene	0.091	60.8%	0.036	0.15
Benzo(K)Fluoranthene	0.048	64.5%	0.017	0.079
Chrysene	0.11	62.9%	0.041	0.18
Dibenz(A,H)Anthracene	0.021	63.9%	0.008	0.034
Indeno(1,2,3-C,D)Pyrene	0.076	62.0%	0.029	0.12
Pyrene	0.15	72.7%	0.041	0.26
Total HMW PAHs - 1/2MDL	0.79	64.7%	0.28	1.30
Total HMW PAHs - MDL	0.79	64.7%	0.28	1.30
Total HMW PAHs - Zero	0.79	64.7%	0.28	1.30
Total PAHs - 1/2MDL	1.06	68.3%	0.34	1.78
Total PAHs - MDL	1.06	68.3%	0.34	1.78
Total PAHs - Zero	1.06	68.3%	0.34	1.78
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	7.00E-04	--	7.00E-04	7.00E-04
1,4-Dioxane (P-Dioxane)	0.005	--	0.005	0.005
2,3,4,6-Tetrachlorophenol	0.007	--	0.007	0.007
2,4,5-Trichlorophenol	0.001	--	0.001	0.001
2,4,6-Trichlorophenol	8.50E-04	--	8.50E-04	8.50E-04
2,4-Dichlorophenol	0.001	--	0.001	0.001
2,4-Dimethylphenol	0.001	--	0.001	0.001

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-009			
	0.50-2.00			
	CFISS-09-SO-0.5-2			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.043	--	0.043	0.043
2,4-Dinitrotoluene	8.00E-04	--	8.00E-04	8.00E-04
2,6-Dinitrotoluene	0.001	--	0.001	0.001
2-Chloronaphthalene	7.50E-04	--	7.50E-04	7.50E-04
2-Chlorophenol	7.50E-04	--	7.50E-04	7.50E-04
2-Methylphenol (O-Cresol)	0.005	--	0.005	0.005
2-Nitroaniline	0.007	--	0.007	0.007
2-Nitrophenol	9.00E-04	--	9.00E-04	9.00E-04
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.015	--	0.015	0.015
3-Nitroaniline	0.004	--	0.004	0.004
4,6-Dinitro-2-Methylphenol	0.028	--	0.028	0.028
4-Bromophenyl Phenyl Ether	0.001	--	0.001	0.001
4-Chloro-3-Methylphenol	7.50E-04	--	7.50E-04	7.50E-04
4-Chloroaniline	5.50E-04	--	5.50E-04	5.50E-04
4-Chlorophenyl Phenyl Ether	9.50E-04	--	9.50E-04	9.50E-04
4-Nitroaniline	7.50E-04	--	7.50E-04	7.50E-04
4-Nitrophenol	0.011	--	0.011	0.011
Acetophenone	0.029	41.1%	0.017	0.041
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.015	--	0.015	0.015
Benzyl Butyl Phthalate	0.011	32.7%	0.007	0.015
Biphenyl (Diphenyl)	0.002	98.2%	3.78E-05	0.004
Bis(2-Chloroethoxy) Methane	7.50E-04	--	7.50E-04	7.50E-04
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	6.00E-04	--	6.00E-04	6.00E-04
Bis(2-Chloroisopropyl) Ether	0.001	--	0.001	0.001
Bis(2-Ethylhexyl) Phthalate	0.017	--	0.017	0.017
Caprolactam	0.011	--	0.011	0.011
Carbazole	0.021	76.1%	0.005	0.037
Dibenzofuran	0.009	70.0%	0.003	0.016
Diethyl Phthalate	0.015	--	0.015	0.015
Dimethyl Phthalate	6.00E-04	--	6.00E-04	6.00E-04
Di-N-Butyl Phthalate	0.007	--	0.007	0.007
Di-N-Octylphthalate	0.010	--	0.010	0.010
Hexachlorobenzene	0.001	--	0.001	0.001
Hexachlorobutadiene	9.50E-04	--	9.50E-04	9.50E-04
Hexachlorocyclopentadiene	8.00E-04	--	8.00E-04	8.00E-04
Hexachloroethane	8.00E-04	--	8.00E-04	8.00E-04
Isophorone	0.010	32.5%	0.007	0.013
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.001	--	0.001	0.001
N-Nitrosodiphenylamine	0.006	--	0.006	0.006
Pentachlorophenol	0.026	--	0.026	0.026
Phenol	0.014	--	0.014	0.014

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-010			
	0.00-0.50			
	CFISS-010-SO-0-0.5			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,100	4.68%	16,299	17,901
Antimony	0.090	28.1%	0.065	0.12
Arsenic	4.80	13.8%	4.14	5.46
Barium	111	4.03%	107	115
Beryllium	0.58	6.32%	0.54	0.62
Cadmium	0.31	15.0%	0.26	0.36
Chromium, Total	22.0	10.6%	19.7	24.3
Chromium, Hexavalent	0.59	10.6%	0.53	0.65
Chromium, Trivalent	21.4	10.6%	19.1	23.7
Cobalt	6.10	3.51%	5.89	6.31
Copper	17.2	12.3%	15.1	19.3
Iron	17,100	3.40%	16,519	17,681
Lead	18.3	48.5%	9.42	27.2
Manganese	515	5.63%	486	544
Mercury	0.024	54.9%	0.011	0.037
Nickel	24.8	14.5%	21.2	28.4
Selenium	0.47	20.0%	0.38	0.56
Silver	0.051	9.03%	0.046	0.056
Thallium	0.098	14.4%	0.084	0.11
Vanadium	14.8	9.21%	13.4	16.2
Zinc	61.1	12.7%	53.3	68.9
Other Inorganic Parameters (mg/kg)				
Cyanide	0.17	40.2%	0.10	0.24
Fluoride	58.6	20.5%	46.6	70.6
Essential Nutrients (mg/kg)				
Calcium	20,500	10.7%	18,313	22,687
Magnesium	12,200	2.82%	11,856	12,544
Potassium	1,200	6.24%	1,125	1,275
Sodium	36.1	30.7%	25.0	47.1
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.45E-04	--	3.45E-04	3.45E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.85E-04	--	3.85E-04	3.85E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.45E-04	--	4.45E-04	4.45E-04
Endosulfan Sulfate	4.30E-04	--	4.30E-04	4.30E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.05E-04	--	4.05E-04	4.05E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.05E-04	--	4.05E-04	4.05E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-010			
	0.00-0.50			
	CFISS-010-SO-0-0.5			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.24	140%	-9.50E-02	0.57
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.24	140%	-9.50E-02	0.57
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.015	47.1%	0.008	0.022
Acenaphthene	0.097	42.0%	0.056	0.14
Acenaphthylene	0.004	36.1%	0.002	0.005
Anthracene	0.24	37.7%	0.15	0.33
Fluoranthene	2.40	37.3%	1.50	3.30
Fluorene	0.068	34.6%	0.044	0.092
Naphthalene	0.028	44.9%	0.015	0.041
Phenanthrene	1.10	31.0%	0.76	1.44
Total LMW PAHs - 1/2MDL	3.95	35.8%	2.54	5.37
Total LMW PAHs - MDL	3.96	35.8%	2.54	5.37
Total LMW PAHs - Zero	3.95	35.9%	2.53	5.36
Benzo(A)Pyrene	1.40	36.1%	0.89	1.91
Benzo(A)Anthracene	1.40	32.0%	0.95	1.85
Benzo(B)Fluoranthene	2.80	29.8%	1.96	3.64
Benzo(G,H,I)Perylene	1.70	30.8%	1.18	2.22
Benzo(K)Fluoranthene	1.10	31.3%	0.76	1.44
Chrysene	2.60	35.9%	1.67	3.53
Dibenz(A,H)Anthracene	0.44	39.8%	0.26	0.62
Indeno(1,2,3-C,D)Pyrene	1.40	31.1%	0.96	1.84
Pyrene	2.70	39.3%	1.64	3.76
Total HMW PAHs - 1/2MDL	15.5	26.8%	11.4	19.7
Total HMW PAHs - MDL	15.5	26.8%	11.4	19.7
Total HMW PAHs - Zero	15.5	26.8%	11.4	19.7
Total PAHs - 1/2MDL	16.7	29.6%	11.7	21.6
Total PAHs - MDL	16.7	29.5%	11.8	21.6
Total PAHs - Zero	16.7	29.6%	11.7	21.6
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.004	--	0.004	0.004
1,4-Dioxane (P-Dioxane)	0.026	--	0.026	0.026
2,3,4,6-Tetrachlorophenol	0.035	--	0.035	0.035
2,4,5-Trichlorophenol	0.006	--	0.006	0.006
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.007	--	0.007	0.007
2,4-Dimethylphenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-010			
	0.00-0.50			
	CFISS-010-SO-0-0.5			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.23	--	0.23	0.23
2,4-Dinitrotoluene	0.004	--	0.004	0.004
2,6-Dinitrotoluene	0.005	--	0.005	0.005
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.024	--	0.024	0.024
2-Nitroaniline	0.039	--	0.039	0.039
2-Nitrophenol	0.005	--	0.005	0.005
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.080	--	0.080	0.080
3-Nitroaniline	0.022	--	0.022	0.022
4,6-Dinitro-2-Methylphenol	0.15	--	0.15	0.15
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.004	--	0.004	0.004
4-Chloroaniline	0.003	--	0.003	0.003
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.004	--	0.004	0.004
4-Nitrophenol	0.060	--	0.060	0.060
Acetophenone	0.005	44.4%	0.003	0.007
Atrazine	0.037	--	0.037	0.037
Benzaldehyde	0.011	--	0.011	0.011
Benzyl Butyl Phthalate	0.060	--	0.060	0.060
Biphenyl (Diphenyl)	0.004	49.7%	0.002	0.005
Bis(2-Chloroethoxy) Methane	0.004	--	0.004	0.004
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.003	--	0.003	0.003
Bis(2-Chloroisopropyl) Ether	0.006	--	0.006	0.006
Bis(2-Ethylhexyl) Phthalate	0.090	--	0.090	0.090
Caprolactam	0.055	--	0.055	0.055
Carbazole	0.37	30.5%	0.26	0.48
Dibenzofuran	0.032	33.5%	0.021	0.043
Diethyl Phthalate	0.025	--	0.025	0.025
Dimethyl Phthalate	0.003	--	0.003	0.003
Di-N-Butyl Phthalate	0.037	--	0.037	0.037
Di-N-Octylphthalate	0.049	--	0.049	0.049
Hexachlorobenzene	0.006	--	0.006	0.006
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.004	--	0.004	0.004
Hexachloroethane	0.004	--	0.004	0.004
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.031	--	0.031	0.031
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.028	--	0.028	0.028
Pentachlorophenol	0.14	--	0.14	0.14
Phenol	0.026	--	0.026	0.026

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-010			
	0.50-2.00			
	CFISS-010-SO-0.5-2			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	19,800	4.58%	18,894	20,706
Antimony	0.085	70.4%	0.025	0.14
Arsenic	5.50	7.46%	5.09	5.91
Barium	121	9.24%	110	132
Beryllium	0.62	4.90%	0.59	0.65
Cadmium	0.080	6.03%	0.075	0.085
Chromium, Total	15.1	7.75%	13.9	16.3
Chromium, Hexavalent	0.40	7.75%	0.37	0.44
Chromium, Trivalent	14.7	7.75%	13.6	15.8
Cobalt	5.70	1.99%	5.59	5.81
Copper	16.4	4.63%	15.6	17.2
Iron	18,500	2.40%	18,056	18,944
Lead	53.1	3.33%	51.3	54.9
Manganese	455	7.15%	422	488
Mercury	0.032	27.4%	0.023	0.041
Nickel	13.6	6.58%	12.7	14.5
Selenium	0.53	19.1%	0.43	0.63
Silver	0.048	9.83%	0.043	0.053
Thallium	0.12	6.56%	0.11	0.13
Vanadium	13.7	3.31%	13.2	14.2
Zinc	51.0	5.42%	48.2	53.8
Other Inorganic Parameters (mg/kg)				
Cyanide	0.034	32.7%	0.023	0.044
Fluoride	46.4	28.8%	33.0	59.8
Essential Nutrients (mg/kg)				
Calcium	8,610	15.1%	7,306	9,914
Magnesium	11,900	2.18%	11,640	12,160
Potassium	1,090	6.91%	1,015	1,165
Sodium	76.1	21.1%	60.1	92.1
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-010			
	0.50-2.00			
	CFISS-010-SO-0.5-2			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.003	47.7%	0.002	0.005
Acenaphthene	0.015	80.9%	0.003	0.027
Acenaphthylene	0.001	62.8%	5.21E-04	0.002
Anthracene	0.029	82.4%	0.005	0.053
Fluoranthene	0.15	71.4%	0.043	0.26
Fluorene	0.013	74.2%	0.003	0.023
Naphthalene	0.008	28.9%	0.005	0.010
Phenanthrene	0.12	78.1%	0.026	0.21
Total LMW PAHs - 1/2MDL	0.34	74.3%	0.087	0.59
Total LMW PAHs - MDL	0.34	74.3%	0.087	0.59
Total LMW PAHs - Zero	0.34	74.3%	0.087	0.59
Benzo(A)Pyrene	0.089	67.2%	0.029	0.15
Benzo(A)Anthracene	0.084	68.8%	0.026	0.14
Benzo(B)Fluoranthene	0.11	60.1%	0.044	0.18
Benzo(G,H,I)Perylene	0.094	60.8%	0.037	0.15
Benzo(K)Fluoranthene	0.054	64.5%	0.019	0.089
Chrysene	0.10	62.9%	0.037	0.16
Dibenz(A,H)Anthracene	0.021	63.9%	0.008	0.034
Indeno(1,2,3-C,D)Pyrene	0.077	62.0%	0.029	0.12
Pyrene	0.15	72.7%	0.041	0.26
Total HMW PAHs - 1/2MDL	0.78	64.7%	0.27	1.28
Total HMW PAHs - MDL	0.78	64.7%	0.27	1.28
Total HMW PAHs - Zero	0.78	64.7%	0.27	1.28
Total PAHs - 1/2MDL	1.01	68.3%	0.32	1.69
Total PAHs - MDL	1.01	68.3%	0.32	1.69
Total PAHs - Zero	1.01	68.3%	0.32	1.69
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	6.00E-04	--	6.00E-04	6.00E-04
1,4-Dioxane (P-Dioxane)	0.005	--	0.005	0.005
2,3,4,6-Tetrachlorophenol	0.006	--	0.006	0.006
2,4,5-Trichlorophenol	0.001	--	0.001	0.001
2,4,6-Trichlorophenol	8.00E-04	--	8.00E-04	8.00E-04
2,4-Dichlorophenol	0.001	--	0.001	0.001
2,4-Dimethylphenol	9.00E-04	--	9.00E-04	9.00E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-010			
	0.50-2.00			
	CFISS-010-SO-0.5-2			
	5/21/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.039	--	0.039	0.039
2,4-Dinitrotoluene	7.00E-04	--	7.00E-04	7.00E-04
2,6-Dinitrotoluene	9.00E-04	--	9.00E-04	9.00E-04
2-Chloronaphthalene	6.50E-04	--	6.50E-04	6.50E-04
2-Chlorophenol	6.50E-04	--	6.50E-04	6.50E-04
2-Methylphenol (O-Cresol)	0.004	--	0.004	0.004
2-Nitroaniline	0.007	--	0.007	0.007
2-Nitrophenol	8.50E-04	--	8.50E-04	8.50E-04
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.014	--	0.014	0.014
3-Nitroaniline	0.004	--	0.004	0.004
4,6-Dinitro-2-Methylphenol	0.025	--	0.025	0.025
4-Bromophenyl Phenyl Ether	0.001	--	0.001	0.001
4-Chloro-3-Methylphenol	7.00E-04	--	7.00E-04	7.00E-04
4-Chloroaniline	4.80E-04	--	4.80E-04	4.80E-04
4-Chlorophenyl Phenyl Ether	9.00E-04	--	9.00E-04	9.00E-04
4-Nitroaniline	7.00E-04	--	7.00E-04	7.00E-04
4-Nitrophenol	0.010	--	0.010	0.010
Acetophenone	0.028	41.1%	0.016	0.040
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.010	--	0.010	0.010
Benzyl Butyl Phthalate	0.010	32.7%	0.007	0.013
Biphenyl (Diphenyl)	0.001	98.2%	2.34E-05	0.003
Bis(2-Chloroethoxy) Methane	7.00E-04	--	7.00E-04	7.00E-04
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	5.00E-04	--	5.00E-04	5.00E-04
Bis(2-Chloroisopropyl) Ether	0.001	--	0.001	0.001
Bis(2-Ethylhexyl) Phthalate	0.016	--	0.016	0.016
Caprolactam	0.010	--	0.010	0.010
Carbazole	0.023	76.1%	0.005	0.041
Dibenzofuran	0.008	70.0%	0.002	0.013
Diethyl Phthalate	0.014	--	0.014	0.014
Dimethyl Phthalate	5.00E-04	--	5.00E-04	5.00E-04
Di-N-Butyl Phthalate	0.007	--	0.007	0.007
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.001	--	0.001	0.001
Hexachlorobutadiene	8.50E-04	--	8.50E-04	8.50E-04
Hexachlorocyclopentadiene	7.50E-04	--	7.50E-04	7.50E-04
Hexachloroethane	7.50E-04	--	7.50E-04	7.50E-04
Isophorone	0.010	32.5%	0.006	0.013
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.001	--	0.001	0.001
N-Nitrosodiphenylamine	0.005	--	0.005	0.005
Pentachlorophenol	0.023	--	0.023	0.023
Phenol	0.004	--	0.004	0.004

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-012			
	0.00-0.50			
	CFISS-012-0.0-0.5			
	5/18/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,300	4.68%	16,490	18,110
Antimony	0.18	28.1%	0.13	0.23
Arsenic	4.50	13.8%	3.88	5.12
Barium	81.2	4.03%	77.9	84.5
Beryllium	0.59	6.32%	0.55	0.63
Cadmium	0.32	15.0%	0.27	0.37
Chromium, Total	18.9	10.6%	16.9	20.9
Chromium, Hexavalent	0.51	10.6%	0.45	0.56
Chromium, Trivalent	18.4	10.6%	16.5	20.3
Cobalt	6.10	3.51%	5.89	6.31
Copper	22.7	12.3%	19.9	25.5
Iron	15,500	3.40%	14,973	16,027
Lead	20.1	48.5%	10.3	29.9
Manganese	383	5.63%	361	405
Mercury	0.011	54.9%	0.005	0.016
Nickel	33.2	14.5%	28.4	38.0
Selenium	0.30	20.0%	0.24	0.36
Silver	0.063	9.03%	0.057	0.069
Thallium	0.076	14.4%	0.065	0.087
Vanadium	16.3	9.21%	14.8	17.8
Zinc	67.9	12.7%	59.3	76.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.13	40.2%	0.078	0.18
Fluoride	80.2	20.5%	63.7	96.7
Essential Nutrients (mg/kg)				
Calcium	20,700	10.7%	18,492	22,908
Magnesium	10,800	2.82%	10,495	11,105
Potassium	1,040	6.24%	975	1,105
Sodium	118	30.7%	81.7	154
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.50E-04	--	3.50E-04	3.50E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.85E-04	--	3.85E-04	3.85E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.45E-04	--	4.45E-04	4.45E-04
Endosulfan Sulfate	4.30E-04	--	4.30E-04	4.30E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.05E-04	--	4.05E-04	4.05E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.05E-04	--	4.05E-04	4.05E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-012			
	0.00-0.50			
	CFISS-012-0.0-0.5			
	5/18/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.061	140%	-2.41E-02	0.15
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.061	140%	-2.41E-02	0.15
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.27	47.1%	0.14	0.40
Acenaphthene	1.50	42.0%	0.87	2.13
Acenaphthylene	0.10	36.1%	0.064	0.14
Anthracene	3.00	37.7%	1.87	4.13
Fluoranthene	16.0	37.3%	10.0	22.0
Fluorene	1.10	34.6%	0.72	1.48
Naphthalene	0.49	44.9%	0.27	0.71
Phenanthrene	12.0	31.0%	8.28	15.7
Total LMW PAHs - 1/2MDL	34.5	35.8%	22.1	46.8
Total LMW PAHs - MDL	34.5	35.8%	22.1	46.8
Total LMW PAHs - Zero	34.5	35.9%	22.1	46.8
Benzo(A)Pyrene	9.80	36.1%	6.26	13.3
Benzo(A)Anthracene	9.70	32.0%	6.59	12.8
Benzo(B)Fluoranthene	13.0	29.8%	9.12	16.9
Benzo(G,H,I)Perylene	9.20	30.8%	6.37	12.0
Benzo(K)Fluoranthene	4.30	31.3%	2.95	5.65
Chrysene	12.0	35.9%	7.69	16.3
Dibenz(A,H)Anthracene	2.40	39.8%	1.44	3.36
Indeno(1,2,3-C,D)Pyrene	7.60	31.1%	5.23	9.97
Pyrene	17.0	39.3%	10.3	23.7
Total HMW PAHs - 1/2MDL	85.0	26.8%	62.2	108
Total HMW PAHs - MDL	85.0	26.8%	62.2	108
Total HMW PAHs - Zero	85.0	26.8%	62.2	108
Total PAHs - 1/2MDL	106	29.6%	74.8	138
Total PAHs - MDL	106	29.5%	74.8	138
Total PAHs - Zero	106	29.6%	74.8	138
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.018	--	0.018	0.018
1,4-Dioxane (P-Dioxane)	0.13	--	0.13	0.13
2,3,4,6-Tetrachlorophenol	0.18	--	0.18	0.18
2,4,5-Trichlorophenol	0.030	--	0.030	0.030
2,4,6-Trichlorophenol	0.023	--	0.023	0.023
2,4-Dichlorophenol	0.033	--	0.033	0.033
2,4-Dimethylphenol	0.026	--	0.026	0.026

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-012			
	0.00-0.50			
	CFISS-012-0.0-0.5			
	5/18/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.15	--	1.15	1.15
2,4-Dinitrotoluene	0.021	--	0.021	0.021
2,6-Dinitrotoluene	0.026	--	0.026	0.026
2-Chloronaphthalene	0.020	--	0.020	0.020
2-Chlorophenol	0.020	--	0.020	0.020
2-Methylphenol (O-Cresol)	0.12	--	0.12	0.12
2-Nitroaniline	0.19	--	0.19	0.19
2-Nitrophenol	0.024	--	0.024	0.024
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.40	--	0.40	0.40
3-Nitroaniline	0.11	--	0.11	0.11
4,6-Dinitro-2-Methylphenol	0.75	--	0.75	0.75
4-Bromophenyl Phenyl Ether	0.030	--	0.030	0.030
4-Chloro-3-Methylphenol	0.020	--	0.020	0.020
4-Chloroaniline	0.014	--	0.014	0.014
4-Chlorophenyl Phenyl Ether	0.026	--	0.026	0.026
4-Nitroaniline	0.021	--	0.021	0.021
4-Nitrophenol	0.30	--	0.30	0.30
Acetophenone	0.023	44.4%	0.013	0.033
Atrazine	0.19	--	0.19	0.19
Benzaldehyde	0.050	--	0.050	0.050
Benzyl Butyl Phthalate	0.29	--	0.29	0.29
Biphenyl (Diphenyl)	0.063	49.7%	0.032	0.094
Bis(2-Chloroethoxy) Methane	0.020	--	0.020	0.020
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.016	--	0.016	0.016
Bis(2-Chloroisopropyl) Ether	0.031	--	0.031	0.031
Bis(2-Ethylhexyl) Phthalate	0.45	--	0.45	0.45
Caprolactam	0.28	--	0.28	0.28
Carbazole	2.20	30.5%	1.53	2.87
Dibenzofuran	0.64	33.5%	0.43	0.85
Diethyl Phthalate	0.13	--	0.13	0.13
Dimethyl Phthalate	0.016	--	0.016	0.016
Di-N-Butyl Phthalate	0.19	--	0.19	0.19
Di-N-Octylphthalate	0.25	--	0.25	0.25
Hexachlorobenzene	0.030	--	0.030	0.030
Hexachlorobutadiene	0.025	--	0.025	0.025
Hexachlorocyclopentadiene	0.022	--	0.022	0.022
Hexachloroethane	0.022	--	0.022	0.022
Isophorone	0.022	--	0.022	0.022
Nitrobenzene	0.16	--	0.16	0.16
N-Nitrosodi-N-Propylamine	0.029	--	0.029	0.029
N-Nitrosodiphenylamine	0.14	--	0.14	0.14
Pentachlorophenol	0.70	--	0.70	0.70
Phenol	0.13	--	0.13	0.13

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-012			
	0.50-2.00			
	CFISS-012-0.5-2			
	5/18/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	11,900	4.58%	11,356	12,444
Antimony	0.085	70.4%	0.025	0.14
Arsenic	4.70	7.46%	4.35	5.05
Barium	102	9.24%	92.6	111
Beryllium	0.47	4.90%	0.45	0.49
Cadmium	0.090	6.03%	0.085	0.095
Chromium, Total	16.8	7.75%	15.5	18.1
Chromium, Hexavalent	0.45	7.75%	0.41	0.48
Chromium, Trivalent	16.4	7.75%	15.1	17.6
Cobalt	6.00	1.99%	5.88	6.12
Copper	19.1	4.63%	18.2	20.0
Iron	15,700	2.40%	15,323	16,077
Lead	10.7	3.33%	10.3	11.1
Manganese	448	7.15%	416	480
Mercury	0.021	27.4%	0.015	0.027
Nickel	13.9	6.58%	13.0	14.8
Selenium	0.18	19.1%	0.15	0.21
Silver	0.059	9.83%	0.053	0.065
Thallium	0.070	6.56%	0.065	0.075
Vanadium	11.3	3.31%	10.9	11.7
Zinc	64.1	5.42%	60.6	67.6
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	32.7%	0.10	0.20
Fluoride	47.9	28.8%	34.1	61.7
Essential Nutrients (mg/kg)				
Calcium	26,100	15.1%	22,148	30,052
Magnesium	11,600	2.18%	11,347	11,853
Potassium	918	6.91%	855	981
Sodium	35.1	21.1%	27.7	42.4
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-012			
	0.50-2.00			
	CFISS-012-0.5-2			
	5/18/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.20	29.2%	0.14	0.26
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.20	29.2%	0.14	0.26
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	1.10	47.7%	0.58	1.62
Acenaphthene	4.90	80.9%	0.93	8.87
Acenaphthylene	0.17	62.8%	0.063	0.28
Anthracene	9.00	82.4%	1.59	16.4
Fluoranthene	43.0	71.4%	12.3	73.7
Fluorene	4.10	74.2%	1.06	7.14
Naphthalene	2.00	28.9%	1.42	2.58
Phenanthrene	40.0	78.1%	8.76	71.2
Total LMW PAHs - 1/2MDL	104	74.3%	26.8	182
Total LMW PAHs - MDL	104	74.3%	26.8	182
Total LMW PAHs - Zero	104	74.3%	26.8	182
Benzo(A)Pyrene	23.0	67.2%	7.54	38.5
Benzo(A)Anthracene	22.0	68.8%	6.87	37.1
Benzo(B)Fluoranthene	31.0	60.1%	12.4	49.6
Benzo(G,H,I)Perylene	17.0	60.8%	6.67	27.3
Benzo(K)Fluoranthene	8.10	64.5%	2.87	13.3
Chrysene	25.0	62.9%	9.27	40.7
Dibenz(A,H)Anthracene	4.00	63.9%	1.45	6.55
Indeno(1,2,3-C,D)Pyrene	14.0	62.0%	5.31	22.7
Pyrene	40.0	72.7%	10.9	69.1
Total HMW PAHs - 1/2MDL	184	64.7%	65.0	303
Total HMW PAHs - MDL	184	64.7%	65.0	303
Total HMW PAHs - Zero	184	64.7%	65.0	303
Total PAHs - 1/2MDL	256	68.3%	81.2	431
Total PAHs - MDL	256	68.3%	81.2	431
Total PAHs - Zero	256	68.3%	81.1	431
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.019	--	0.019	0.019
1,4-Dioxane (P-Dioxane)	0.13	--	0.13	0.13
2,3,4,6-Tetrachlorophenol	0.18	--	0.18	0.18
2,4,5-Trichlorophenol	0.030	--	0.030	0.030
2,4,6-Trichlorophenol	0.023	--	0.023	0.023
2,4-Dichlorophenol	0.033	--	0.033	0.033
2,4-Dimethylphenol	0.027	--	0.027	0.027

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-012			
	0.50-2.00			
	CFISS-012-0.5-2			
	5/18/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.15	--	1.15	1.15
2,4-Dinitrotoluene	0.021	--	0.021	0.021
2,6-Dinitrotoluene	0.026	--	0.026	0.026
2-Chloronaphthalene	0.020	--	0.020	0.020
2-Chlorophenol	0.020	--	0.020	0.020
2-Methylphenol (O-Cresol)	0.12	--	0.12	0.12
2-Nitroaniline	0.20	--	0.20	0.20
2-Nitrophenol	0.024	--	0.024	0.024
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.40	--	0.40	0.40
3-Nitroaniline	0.11	--	0.11	0.11
4,6-Dinitro-2-Methylphenol	0.75	--	0.75	0.75
4-Bromophenyl Phenyl Ether	0.030	--	0.030	0.030
4-Chloro-3-Methylphenol	0.020	--	0.020	0.020
4-Chloroaniline	0.014	--	0.014	0.014
4-Chlorophenyl Phenyl Ether	0.026	--	0.026	0.026
4-Nitroaniline	0.021	--	0.021	0.021
4-Nitrophenol	0.30	--	0.30	0.30
Acetophenone	0.023	41.1%	0.014	0.032
Atrazine	0.19	--	0.19	0.19
Benzaldehyde	0.055	--	0.055	0.055
Benzyl Butyl Phthalate	0.29	32.7%	0.20	0.38
Biphenyl (Diphenyl)	0.25	98.2%	0.004	0.50
Bis(2-Chloroethoxy) Methane	0.020	--	0.020	0.020
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.016	--	0.016	0.016
Bis(2-Chloroisopropyl) Ether	0.032	--	0.032	0.032
Bis(2-Ethylhexyl) Phthalate	0.45	--	0.45	0.45
Caprolactam	0.28	--	0.28	0.28
Carbazole	5.20	76.1%	1.24	9.16
Dibenzofuran	2.30	70.0%	0.69	3.91
Diethyl Phthalate	0.13	--	0.13	0.13
Dimethyl Phthalate	0.016	--	0.016	0.016
Di-N-Butyl Phthalate	0.19	--	0.19	0.19
Di-N-Octylphthalate	0.25	--	0.25	0.25
Hexachlorobenzene	0.031	--	0.031	0.031
Hexachlorobutadiene	0.025	--	0.025	0.025
Hexachlorocyclopentadiene	0.022	--	0.022	0.022
Hexachloroethane	0.022	--	0.022	0.022
Isophorone	0.022	32.5%	0.015	0.028
Nitrobenzene	0.16	--	0.16	0.16
N-Nitrosodi-N-Propylamine	0.029	--	0.029	0.029
N-Nitrosodiphenylamine	0.14	--	0.14	0.14
Pentachlorophenol	0.70	--	0.70	0.70
Phenol	0.13	--	0.13	0.13

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-013			
	0.00-0.50			
	CFISS-013-SO-0-0.5			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	25,200	4.68%	24,020	26,380
Antimony	1.10	28.1%	0.79	1.41
Arsenic	5.50	13.8%	4.74	6.26
Barium	99.3	4.03%	95.3	103
Beryllium	1.00	6.32%	0.94	1.06
Cadmium	0.51	15.0%	0.43	0.59
Chromium, Total	25.0	10.6%	22.4	27.6
Chromium, Hexavalent	0.67	10.6%	0.60	0.74
Chromium, Trivalent	24.3	10.6%	21.8	26.9
Cobalt	6.20	3.51%	5.98	6.42
Copper	44.8	12.3%	39.3	50.3
Iron	19,500	3.40%	18,837	20,163
Lead	35.9	48.5%	18.5	53.3
Manganese	403	5.63%	380	426
Mercury	0.032	54.9%	0.014	0.050
Nickel	37.2	14.5%	31.8	42.6
Selenium	0.35	20.0%	0.28	0.42
Silver	0.11	9.03%	0.10	0.12
Thallium	0.10	14.4%	0.086	0.11
Vanadium	22.6	9.21%	20.5	24.7
Zinc	88.4	12.7%	77.2	99.6
Other Inorganic Parameters (mg/kg)				
Cyanide	0.51	40.2%	0.30	0.72
Fluoride	251	20.5%	199	303
Essential Nutrients (mg/kg)				
Calcium	24,700	10.7%	22,065	27,335
Magnesium	9,970	2.82%	9,689	10,251
Potassium	1,530	6.24%	1,434	1,626
Sodium	701	30.7%	486	916
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.45E-04	--	3.45E-04	3.45E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.80E-04	--	3.80E-04	3.80E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.45E-04	--	4.45E-04	4.45E-04
Endosulfan Sulfate	4.25E-04	--	4.25E-04	4.25E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.00E-04	--	4.00E-04	4.00E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.00E-04	--	4.00E-04	4.00E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-013			
	0.00-0.50			
	CFISS-013-SO-0-0.5			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.27	140%	-1.07E-01	0.65
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.27	140%	-1.07E-01	0.65
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	9.10	47.1%	4.82	13.4
Acenaphthene	38.0	42.0%	22.0	54.0
Acenaphthylene	3.00	36.1%	1.92	4.08
Anthracene	71.0	37.7%	44.3	97.7
Fluoranthene	300	37.3%	188	412
Fluorene	31.0	34.6%	20.3	41.7
Naphthalene	17.0	44.9%	9.36	24.6
Phenanthrene	270	31.0%	186	354
Total LMW PAHs - 1/2MDL	739	35.8%	474	1,004
Total LMW PAHs - MDL	739	35.8%	475	1,004
Total LMW PAHs - Zero	739	35.9%	474	1,004
Benzo(A)Pyrene	130	36.1%	83.0	177
Benzo(A)Anthracene	140	32.0%	95.1	185
Benzo(B)Fluoranthene	150	29.8%	105	195
Benzo(G,H,I)Perylene	100	30.8%	69.2	131
Benzo(K)Fluoranthene	51.0	31.3%	35.0	67.0
Chrysene	160	35.9%	103	217
Dibenz(A,H)Anthracene	25.0	39.8%	15.0	35.0
Indeno(1,2,3-C,D)Pyrene	85.0	31.1%	58.5	111
Pyrene	290	39.3%	176	404
Total HMW PAHs - 1/2MDL	1,131	26.8%	828	1,434
Total HMW PAHs - MDL	1,131	26.8%	828	1,434
Total HMW PAHs - Zero	1,131	26.8%	828	1,434
Total PAHs - 1/2MDL	1,711	29.6%	1,205	2,217
Total PAHs - MDL	1,711	29.5%	1,205	2,217
Total PAHs - Zero	1,711	29.6%	1,205	2,217
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.070	--	0.070	0.070
1,4-Dioxane (P-Dioxane)	0.50	--	0.50	0.50
2,3,4,6-Tetrachlorophenol	0.70	--	0.70	0.70
2,4,5-Trichlorophenol	0.12	--	0.12	0.12
2,4,6-Trichlorophenol	0.090	--	0.090	0.090
2,4-Dichlorophenol	0.13	--	0.13	0.13
2,4-Dimethylphenol	0.25	--	0.25	0.25

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-013			
	0.00-0.50			
	CFISS-013-SO-0-0.5			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	4.45	--	4.45	4.45
2,4-Dinitrotoluene	0.080	--	0.080	0.080
2,6-Dinitrotoluene	0.10	--	0.10	0.10
2-Chloronaphthalene	0.075	--	0.075	0.075
2-Chlorophenol	0.075	--	0.075	0.075
2-Methylphenol (O-Cresol)	0.48	--	0.48	0.48
2-Nitroaniline	0.75	--	0.75	0.75
2-Nitrophenol	0.095	--	0.095	0.095
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	1.55	--	1.55	1.55
3-Nitroaniline	0.42	--	0.42	0.42
4,6-Dinitro-2-Methylphenol	2.85	--	2.85	2.85
4-Bromophenyl Phenyl Ether	0.12	--	0.12	0.12
4-Chloro-3-Methylphenol	0.080	--	0.080	0.080
4-Chloroaniline	0.055	--	0.055	0.055
4-Chlorophenyl Phenyl Ether	0.10	--	0.10	0.10
4-Nitroaniline	0.080	--	0.080	0.080
4-Nitrophenol	1.15	--	1.15	1.15
Acetophenone	0.090	44.4%	0.050	0.13
Atrazine	0.70	--	0.70	0.70
Benzaldehyde	0.21	--	0.21	0.21
Benzyl Butyl Phthalate	1.15	--	1.15	1.15
Biphenyl (Diphenyl)	2.10	49.7%	1.06	3.14
Bis(2-Chloroethoxy) Methane	0.080	--	0.080	0.080
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.060	--	0.060	0.060
Bis(2-Chloroisopropyl) Ether	0.13	--	0.13	0.13
Bis(2-Ethylhexyl) Phthalate	1.75	--	1.75	1.75
Caprolactam	1.10	--	1.10	1.10
Carbazole	38.0	30.5%	26.4	49.6
Dibenzofuran	17.0	33.5%	11.3	22.7
Diethyl Phthalate	0.50	--	0.50	0.50
Dimethyl Phthalate	0.060	--	0.060	0.060
Di-N-Butyl Phthalate	0.70	--	0.70	0.70
Di-N-Octylphthalate	0.95	--	0.95	0.95
Hexachlorobenzene	0.12	--	0.12	0.12
Hexachlorobutadiene	0.095	--	0.095	0.095
Hexachlorocyclopentadiene	0.085	--	0.085	0.085
Hexachloroethane	0.085	--	0.085	0.085
Isophorone	0.085	--	0.085	0.085
Nitrobenzene	0.60	--	0.60	0.60
N-Nitrosodi-N-Propylamine	0.11	--	0.11	0.11
N-Nitrosodiphenylamine	0.55	--	0.55	0.55
Pentachlorophenol	2.65	--	2.65	2.65
Phenol	0.50	--	0.50	0.50

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-013			
	0.50-2.00			
	CFISS-013-SO-0.5-2			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	27,300	4.58%	26,051	28,549
Antimony	0.62	70.4%	0.18	1.06
Arsenic	6.80	7.46%	6.29	7.31
Barium	115	9.24%	104	126
Beryllium	2.10	4.90%	2.00	2.20
Cadmium	0.87	6.03%	0.82	0.92
Chromium, Total	48.5	7.75%	44.7	52.3
Chromium, Hexavalent	1.30	7.75%	1.20	1.40
Chromium, Trivalent	47.2	7.75%	43.5	50.9
Cobalt	7.70	1.99%	7.55	7.85
Copper	105	4.63%	100	110
Iron	27,100	2.40%	26,449	27,751
Lead	56.0	3.33%	54.1	57.9
Manganese	518	7.15%	481	555
Mercury	0.034	27.4%	0.025	0.043
Nickel	62.3	6.58%	58.2	66.4
Selenium	0.43	19.1%	0.35	0.51
Silver	0.095	9.83%	0.086	0.10
Thallium	0.15	6.56%	0.14	0.16
Vanadium	54.1	3.31%	52.3	55.9
Zinc	97.4	5.42%	92.1	103
Other Inorganic Parameters (mg/kg)				
Cyanide	0.39	32.7%	0.26	0.52
Fluoride	576	28.8%	410	742
Essential Nutrients (mg/kg)				
Calcium	25,600	15.1%	21,724	29,476
Magnesium	10,200	2.18%	9,978	10,422
Potassium	2,000	6.91%	1,862	2,138
Sodium	2,360	21.1%	1,863	2,857
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-013			
	0.50-2.00			
	CFISS-013-SO-0.5-2			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.64	29.2%	0.45	0.83
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.64	29.2%	0.45	0.83
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	27.0	47.7%	14.1	39.9
Acenaphthene	110	80.9%	21.0	199
Acenaphthylene	3.10	62.8%	1.15	5.05
Anthracene	150	82.4%	26.4	274
Fluoranthene	440	71.4%	126	754
Fluorene	94.0	74.2%	24.3	164
Naphthalene	68.0	28.9%	48.4	87.6
Phenanthrene	450	78.1%	98.5	801
Total LMW PAHs - 1/2MDL	1,342	74.3%	345	2,339
Total LMW PAHs - MDL	1,342	74.3%	345	2,339
Total LMW PAHs - Zero	1,342	74.3%	345	2,339
Benzo(A)Pyrene	240	67.2%	78.6	401
Benzo(A)Anthracene	240	68.8%	74.9	405
Benzo(B)Fluoranthene	270	60.1%	108	432
Benzo(G,H,I)Perylene	220	60.8%	86.3	354
Benzo(K)Fluoranthene	130	64.5%	46.1	214
Chrysene	250	62.9%	92.7	407
Dibenz(A,H)Anthracene	51.0	63.9%	18.4	83.6
Indeno(1,2,3-C,D)Pyrene	170	62.0%	64.5	275
Pyrene	410	72.7%	112	708
Total HMW PAHs - 1/2MDL	1,981	64.7%	699	3,263
Total HMW PAHs - MDL	1,981	64.7%	699	3,263
Total HMW PAHs - Zero	1,981	64.7%	699	3,263
Total PAHs - 1/2MDL	3,026	68.3%	958	5,094
Total PAHs - MDL	3,026	68.3%	959	5,094
Total PAHs - Zero	3,026	68.3%	958	5,094
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.15	--	0.15	0.15
1,4-Dioxane (P-Dioxane)	1.05	--	1.05	1.05
2,3,4,6-Tetrachlorophenol	1.40	--	1.40	1.40
2,4,5-Trichlorophenol	0.24	--	0.24	0.24
2,4,6-Trichlorophenol	0.19	--	0.19	0.19
2,4-Dichlorophenol	0.26	--	0.26	0.26
2,4-Dimethylphenol	0.71	--	0.71	0.71

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-013			
	0.50-2.00			
	CFISS-013-SO-0.5-2			
	5/17/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	9.00	--	9.00	9.00
2,4-Dinitrotoluene	0.17	--	0.17	0.17
2,6-Dinitrotoluene	0.21	--	0.21	0.21
2-Chloronaphthalene	0.16	--	0.16	0.16
2-Chlorophenol	0.16	--	0.16	0.16
2-Methylphenol (O-Cresol)	0.95	--	0.95	0.95
2-Nitroaniline	1.50	--	1.50	1.50
2-Nitrophenol	0.19	--	0.19	0.19
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	3.10	--	3.10	3.10
3-Nitroaniline	0.85	--	0.85	0.85
4,6-Dinitro-2-Methylphenol	5.50	--	5.50	5.50
4-Bromophenyl Phenyl Ether	0.24	--	0.24	0.24
4-Chloro-3-Methylphenol	0.16	--	0.16	0.16
4-Chloroaniline	0.11	--	0.11	0.11
4-Chlorophenyl Phenyl Ether	0.20	--	0.20	0.20
4-Nitroaniline	0.16	--	0.16	0.16
4-Nitrophenol	2.35	--	2.35	2.35
Acetophenone	0.18	41.1%	0.11	0.25
Atrazine	1.45	--	1.45	1.45
Benzaldehyde	0.42	--	0.42	0.42
Benzyl Butyl Phthalate	2.30	32.7%	1.55	3.05
Biphenyl (Diphenyl)	7.10	98.2%	0.13	14.1
Bis(2-Chloroethoxy) Methane	0.16	--	0.16	0.16
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.12	--	0.12	0.12
Bis(2-Chloroisopropyl) Ether	0.25	--	0.25	0.25
Bis(2-Ethylhexyl) Phthalate	3.55	--	3.55	3.55
Caprolactam	2.15	--	2.15	2.15
Carbazole	78.0	76.1%	18.6	137
Dibenzofuran	55.0	70.0%	16.5	93.5
Diethyl Phthalate	1.00	--	1.00	1.00
Dimethyl Phthalate	0.12	--	0.12	0.12
Di-N-Butyl Phthalate	1.45	--	1.45	1.45
Di-N-Octylphthalate	1.95	--	1.95	1.95
Hexachlorobenzene	0.24	--	0.24	0.24
Hexachlorobutadiene	0.20	--	0.20	0.20
Hexachlorocyclopentadiene	0.17	--	0.17	0.17
Hexachloroethane	0.17	--	0.17	0.17
Isophorone	0.17	32.5%	0.11	0.23
Nitrobenzene	1.20	--	1.20	1.20
N-Nitrosodi-N-Propylamine	0.23	--	0.23	0.23
N-Nitrosodiphenylamine	1.10	--	1.10	1.10
Pentachlorophenol	5.50	--	5.50	5.50
Phenol	1.00	--	1.00	1.00

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-014			
	0.00-0.50			
	CFISS-014-SO-0-0.5			
	5/16/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	26,000	4.68%	24,783	27,217
Antimony	0.47	28.1%	0.34	0.60
Arsenic	6.60	13.8%	5.69	7.51
Barium	129	4.03%	124	134
Beryllium	0.85	6.32%	0.80	0.90
Cadmium	0.40	15.0%	0.34	0.46
Chromium, Total	36.8	10.6%	32.9	40.7
Chromium, Hexavalent	0.98	10.6%	0.88	1.09
Chromium, Trivalent	35.8	10.6%	32.0	39.6
Cobalt	7.30	3.51%	7.04	7.56
Copper	65.9	12.3%	57.8	74.0
Iron	30,500	3.40%	29,463	31,537
Lead	216	48.5%	111	321
Manganese	545	5.63%	514	576
Mercury	0.025	54.9%	0.011	0.039
Nickel	56.1	14.5%	48.0	64.2
Selenium	1.60	20.0%	1.28	1.92
Silver	0.080	9.03%	0.073	0.087
Thallium	0.12	14.4%	0.10	0.14
Vanadium	24.0	9.21%	21.8	26.2
Zinc	85.5	12.7%	74.6	96.4
Other Inorganic Parameters (mg/kg)				
Cyanide	1.50	40.2%	0.90	2.10
Fluoride	584	20.5%	464	704
Essential Nutrients (mg/kg)				
Calcium	20,300	10.7%	18,135	22,465
Magnesium	9,980	2.82%	9,699	10,261
Potassium	1,630	6.24%	1,528	1,732
Sodium	2,060	30.7%	1,427	2,693
Pesticides (mg/kg)				
Aldrin	5.00E-04	--	5.00E-04	5.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.45E-04	--	3.45E-04	3.45E-04
Alpha Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.85E-04	--	3.85E-04	3.85E-04
Beta Endosulfan	9.00E-04	--	9.00E-04	9.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	2.10E-04	--	2.10E-04	2.10E-04
Dieldrin	4.45E-04	--	4.45E-04	4.45E-04
Endosulfan Sulfate	4.30E-04	--	4.30E-04	4.30E-04
Endrin	4.90E-04	--	4.90E-04	4.90E-04
Endrin Aldehyde	8.00E-04	--	8.00E-04	8.00E-04
Endrin Ketone	6.50E-04	--	6.50E-04	6.50E-04
Gamma Bhc (Lindane)	3.15E-04	--	3.15E-04	3.15E-04
Heptachlor	4.05E-04	--	4.05E-04	4.05E-04
Heptachlor Epoxide	5.00E-04	--	5.00E-04	5.00E-04
Methoxychlor	8.00E-04	--	8.00E-04	8.00E-04
P,P'-DDD	6.00E-04	--	6.00E-04	6.00E-04
P,P'-DDE	4.05E-04	--	4.05E-04	4.05E-04
P,P'-DDT	6.50E-04	--	6.50E-04	6.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-014			
	0.00-0.50			
	CFISS-014-SO-0-0.5			
	5/16/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.013	--	0.013	0.013
trans-Chlordane	6.00E-04	--	6.00E-04	6.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.20	--	0.20	0.20
PCB-1254 (Aroclor 1254)	0.005	140%	-1.86E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.20	140%	-7.92E-02	0.48
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.099	47.1%	0.052	0.15
Acenaphthene	0.69	42.0%	0.40	0.98
Acenaphthylene	0.042	36.1%	0.027	0.057
Anthracene	1.00	37.7%	0.62	1.38
Fluoranthene	6.10	37.3%	3.82	8.38
Fluorene	0.50	34.6%	0.33	0.67
Naphthalene	0.22	44.9%	0.12	0.32
Phenanthrene	4.10	31.0%	2.83	5.37
Total LMW PAHs - 1/2MDL	12.8	35.8%	8.18	17.3
Total LMW PAHs - MDL	12.8	35.8%	8.19	17.3
Total LMW PAHs - Zero	12.8	35.9%	8.18	17.3
Benzo(A)Pyrene	3.50	36.1%	2.23	4.77
Benzo(A)Anthracene	3.90	32.0%	2.65	5.15
Benzo(B)Fluoranthene	7.30	29.8%	5.12	9.48
Benzo(G,H,I)Perylene	3.80	30.8%	2.63	4.97
Benzo(K)Fluoranthene	2.50	31.3%	1.72	3.28
Chrysene	6.70	35.9%	4.30	9.10
Dibenz(A,H)Anthracene	0.81	39.8%	0.49	1.13
Indeno(1,2,3-C,D)Pyrene	3.00	31.1%	2.07	3.93
Pyrene	6.80	39.3%	4.13	9.47
Total HMW PAHs - 1/2MDL	38.3	26.8%	28.0	48.6
Total HMW PAHs - MDL	38.3	26.8%	28.0	48.6
Total HMW PAHs - Zero	38.3	26.8%	28.0	48.6
Total PAHs - 1/2MDL	43.7	29.6%	30.8	56.6
Total PAHs - MDL	43.7	29.5%	30.8	56.6
Total PAHs - Zero	43.7	29.6%	30.8	56.6
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.018	--	0.018	0.018
1,4-Dioxane (P-Dioxane)	0.13	--	0.13	0.13
2,3,4,6-Tetrachlorophenol	0.18	--	0.18	0.18
2,4,5-Trichlorophenol	0.030	--	0.030	0.030
2,4,6-Trichlorophenol	0.023	--	0.023	0.023
2,4-Dichlorophenol	0.032	--	0.032	0.032
2,4-Dimethylphenol	0.026	--	0.026	0.026

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-014			
	0.00-0.50			
	CFISS-014-SO-0-0.5			
	5/16/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.10	--	1.10	1.10
2,4-Dinitrotoluene	0.021	--	0.021	0.021
2,6-Dinitrotoluene	0.026	--	0.026	0.026
2-Chloronaphthalene	0.019	--	0.019	0.019
2-Chlorophenol	0.020	--	0.020	0.020
2-Methylphenol (O-Cresol)	0.12	--	0.12	0.12
2-Nitroaniline	0.19	--	0.19	0.19
2-Nitrophenol	0.024	--	0.024	0.024
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.39	--	0.39	0.39
3-Nitroaniline	0.11	--	0.11	0.11
4,6-Dinitro-2-Methylphenol	0.70	--	0.70	0.70
4-Bromophenyl Phenyl Ether	0.029	--	0.029	0.029
4-Chloro-3-Methylphenol	0.020	--	0.020	0.020
4-Chloroaniline	0.014	--	0.014	0.014
4-Chlorophenyl Phenyl Ether	0.025	--	0.025	0.025
4-Nitroaniline	0.020	--	0.020	0.020
4-Nitrophenol	0.29	--	0.29	0.29
Acetophenone	0.023	44.4%	0.013	0.033
Atrazine	0.18	--	0.18	0.18
Benzaldehyde	0.050	--	0.050	0.050
Benzyl Butyl Phthalate	0.29	--	0.29	0.29
Biphenyl (Diphenyl)	0.018	49.7%	0.009	0.026
Bis(2-Chloroethoxy) Methane	0.020	--	0.020	0.020
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.015	--	0.015	0.015
Bis(2-Chloroisopropyl) Ether	0.031	--	0.031	0.031
Bis(2-Ethylhexyl) Phthalate	0.44	--	0.44	0.44
Caprolactam	0.27	--	0.27	0.27
Carbazole	0.53	30.5%	0.37	0.69
Dibenzofuran	0.23	33.5%	0.15	0.31
Diethyl Phthalate	0.13	--	0.13	0.13
Dimethyl Phthalate	0.015	--	0.015	0.015
Di-N-Butyl Phthalate	0.18	--	0.18	0.18
Di-N-Octylphthalate	0.24	--	0.24	0.24
Hexachlorobenzene	0.030	--	0.030	0.030
Hexachlorobutadiene	0.025	--	0.025	0.025
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.022	--	0.022	0.022
Isophorone	0.021	--	0.021	0.021
Nitrobenzene	0.15	--	0.15	0.15
N-Nitrosodi-N-Propylamine	0.028	--	0.028	0.028
N-Nitrosodiphenylamine	0.14	--	0.14	0.14
Pentachlorophenol	0.65	--	0.65	0.65
Phenol	0.13	--	0.13	0.13

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-014			
	0.50-2.00			
	CFISS-014-SO-0.5-2			
	5/16/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	21,500	4.58%	20,516	22,484
Antimony	0.22	70.4%	0.065	0.37
Arsenic	5.30	7.46%	4.90	5.70
Barium	150	9.24%	136	164
Beryllium	0.91	4.90%	0.87	0.95
Cadmium	0.16	6.03%	0.15	0.17
Chromium, Total	28.6	7.75%	26.4	30.8
Chromium, Hexavalent	0.77	7.75%	0.71	0.82
Chromium, Trivalent	27.8	7.75%	25.7	30.0
Cobalt	6.30	1.99%	6.17	6.43
Copper	18.3	4.63%	17.5	19.1
Iron	17,200	2.40%	16,787	17,613
Lead	17.9	3.33%	17.3	18.5
Manganese	481	7.15%	447	515
Mercury	0.024	27.4%	0.017	0.031
Nickel	26.7	6.58%	24.9	28.5
Selenium	0.27	19.1%	0.22	0.32
Silver	0.039	9.83%	0.035	0.043
Thallium	0.12	6.56%	0.11	0.13
Vanadium	17.5	3.31%	16.9	18.1
Zinc	73.5	5.42%	69.5	77.5
Other Inorganic Parameters (mg/kg)				
Cyanide	4.10	32.7%	2.76	5.44
Fluoride	763	28.8%	543	983
Essential Nutrients (mg/kg)				
Calcium	20,300	15.1%	17,226	23,374
Magnesium	11,200	2.18%	10,956	11,444
Potassium	2,320	6.91%	2,160	2,480
Sodium	3,640	21.1%	2,873	4,407
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-014			
	0.50-2.00			
	CFISS-014-SO-0.5-2			
	5/16/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.10	29.2%	0.071	0.13
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.10	29.2%	0.071	0.13
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.008	47.7%	0.004	0.012
Acenaphthene	0.041	80.9%	0.008	0.074
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.076	82.4%	0.013	0.14
Fluoranthene	0.51	71.4%	0.15	0.87
Fluorene	0.027	74.2%	0.007	0.047
Naphthalene	0.013	28.9%	0.009	0.017
Phenanthrene	0.35	78.1%	0.077	0.62
Total LMW PAHs - 1/2MDL	1.03	74.3%	0.26	1.79
Total LMW PAHs - MDL	1.03	74.3%	0.26	1.79
Total LMW PAHs - Zero	1.03	74.3%	0.26	1.79
Benzo(A)Pyrene	0.27	67.2%	0.088	0.45
Benzo(A)Anthracene	0.28	68.8%	0.087	0.47
Benzo(B)Fluoranthene	0.44	60.1%	0.18	0.70
Benzo(G,H,I)Perylene	0.34	60.8%	0.13	0.55
Benzo(K)Fluoranthene	0.24	64.5%	0.085	0.39
Chrysene	0.45	62.9%	0.17	0.73
Dibenz(A,H)Anthracene	0.070	63.9%	0.025	0.11
Indeno(1,2,3-C,D)Pyrene	0.25	62.0%	0.095	0.41
Pyrene	0.52	72.7%	0.14	0.90
Total HMW PAHs - 1/2MDL	2.86	64.7%	1.01	4.71
Total HMW PAHs - MDL	2.86	64.7%	1.01	4.71
Total HMW PAHs - Zero	2.86	64.7%	1.01	4.71
Total PAHs - 1/2MDL	3.44	68.3%	1.09	5.79
Total PAHs - MDL	3.44	68.3%	1.09	5.79
Total PAHs - Zero	3.44	68.3%	1.09	5.79
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.002	--	0.002	0.002
1,4-Dioxane (P-Dioxane)	0.011	--	0.011	0.011
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.003	--	0.003	0.003
2,4,6-Trichlorophenol	0.002	--	0.002	0.002
2,4-Dichlorophenol	0.003	--	0.003	0.003
2,4-Dimethylphenol	0.002	--	0.002	0.002

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-014			
	0.50-2.00			
	CFISS-014-SO-0.5-2			
	5/16/2018			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.095	--	0.095	0.095
2,4-Dinitrotoluene	0.002	--	0.002	0.002
2,6-Dinitrotoluene	0.002	--	0.002	0.002
2-Chloronaphthalene	0.002	--	0.002	0.002
2-Chlorophenol	0.002	--	0.002	0.002
2-Methylphenol (O-Cresol)	0.010	--	0.010	0.010
2-Nitroaniline	0.016	--	0.016	0.016
2-Nitrophenol	0.002	--	0.002	0.002
3- And 4- Methylphenol (Total)	--	--	--	--
3,3'-Dichlorobenzidine	0.033	--	0.033	0.033
3-Nitroaniline	0.009	--	0.009	0.009
4,6-Dinitro-2-Methylphenol	0.060	--	0.060	0.060
4-Bromophenyl Phenyl Ether	0.002	--	0.002	0.002
4-Chloro-3-Methylphenol	0.002	--	0.002	0.002
4-Chloroaniline	0.001	--	0.001	0.001
4-Chlorophenyl Phenyl Ether	0.002	--	0.002	0.002
4-Nitroaniline	0.002	--	0.002	0.002
4-Nitrophenol	0.025	--	0.025	0.025
Acetophenone	0.002	41.1%	0.001	0.003
Atrazine	0.016	--	0.016	0.016
Benzaldehyde	0.004	--	0.004	0.004
Benzyl Butyl Phthalate	0.024	32.7%	0.016	0.032
Biphenyl (Diphenyl)	0.003	98.2%	5.76E-05	0.006
Bis(2-Chloroethoxy) Methane	0.002	--	0.002	0.002
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.001	--	0.001	0.001
Bis(2-Chloroisopropyl) Ether	0.003	--	0.003	0.003
Bis(2-Ethylhexyl) Phthalate	0.037	--	0.037	0.037
Caprolactam	0.023	--	0.023	0.023
Carbazole	0.057	76.1%	0.014	0.10
Dibenzofuran	0.018	70.0%	0.005	0.031
Diethyl Phthalate	0.011	--	0.011	0.011
Dimethyl Phthalate	0.001	--	0.001	0.001
Di-N-Butyl Phthalate	0.016	--	0.016	0.016
Di-N-Octylphthalate	0.021	--	0.021	0.021
Hexachlorobenzene	0.003	--	0.003	0.003
Hexachlorobutadiene	0.002	--	0.002	0.002
Hexachlorocyclopentadiene	0.002	--	0.002	0.002
Hexachloroethane	0.002	--	0.002	0.002
Isophorone	0.002	32.5%	0.001	0.002
Nitrobenzene	0.013	--	0.013	0.013
N-Nitrosodi-N-Propylamine	0.002	--	0.002	0.002
N-Nitrosodiphenylamine	0.012	--	0.012	0.012
Pentachlorophenol	0.055	--	0.055	0.055
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-016			
	0.00-0.50			
	CFISS-016-SO-0-0.5			
	6/23/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	14,500	4.68%	13,821	15,179
Antimony	0.17	28.1%	0.12	0.22
Arsenic	5.10	13.8%	4.39	5.81
Barium	99.8	4.03%	95.8	104
Beryllium	0.59	6.32%	0.55	0.63
Cadmium	0.19	15.0%	0.16	0.22
Chromium, Total	18.3	10.6%	16.4	20.2
Chromium, Hexavalent	0.49	10.6%	0.44	0.54
Chromium, Trivalent	17.8	10.6%	15.9	19.7
Cobalt	6.10	3.51%	5.89	6.31
Copper	19.0	12.3%	16.7	21.3
Iron	16,000	3.40%	15,456	16,544
Lead	19.1	48.5%	9.83	28.4
Manganese	439	5.63%	414	464
Mercury	0.018	54.9%	0.008	0.028
Nickel	25.4	14.5%	21.7	29.1
Selenium	1.70	20.0%	1.36	2.04
Silver	0.055	9.03%	0.050	0.060
Thallium	0.091	14.4%	0.078	0.10
Vanadium	14.6	9.21%	13.3	15.9
Zinc	59.7	12.7%	52.1	67.3
Other Inorganic Parameters (mg/kg)				
Cyanide	0.12	40.2%	0.072	0.17
Fluoride	27.6	20.5%	21.9	33.3
Essential Nutrients (mg/kg)				
Calcium	16,900	10.7%	15,097	18,703
Magnesium	11,500	2.82%	11,176	11,824
Potassium	1,250	6.24%	1,172	1,328
Sodium	64.1	30.7%	44.4	83.8
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.50E-04	--	4.50E-04	4.50E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.50E-04	--	4.50E-04	4.50E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.25E-04	--	4.25E-04	4.25E-04
P,P'-DDE	4.70E-04	--	4.70E-04	4.70E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-016			
	0.00-0.50			
	CFISS-016-SO-0-0.5			
	6/23/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	140%	-1.76E-03	0.011
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	140%	-1.76E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.011	47.1%	0.006	0.016
Acenaphthene	0.025	42.0%	0.015	0.035
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.049	37.7%	0.031	0.067
Fluoranthene	0.57	37.3%	0.36	0.78
Fluorene	0.015	34.6%	0.010	0.020
Naphthalene	0.014	44.9%	0.008	0.020
Phenanthrene	0.31	31.0%	0.21	0.41
Total LMW PAHs - 1/2MDL	1.00	35.8%	0.64	1.36
Total LMW PAHs - MDL	1.00	35.8%	0.64	1.36
Total LMW PAHs - Zero	0.99	35.9%	0.64	1.35
Benzo(A)Pyrene	0.42	36.1%	0.27	0.57
Benzo(A)Anthracene	0.32	32.0%	0.22	0.42
Benzo(B)Fluoranthene	0.74	29.8%	0.52	0.96
Benzo(G,H,I)Perylene	0.43	30.8%	0.30	0.56
Benzo(K)Fluoranthene	0.24	31.3%	0.16	0.32
Chrysene	0.49	35.9%	0.31	0.67
Dibenz(A,H)Anthracene	0.11	39.8%	0.066	0.15
Indeno(1,2,3-C,D)Pyrene	0.41	31.1%	0.28	0.54
Pyrene	0.74	39.3%	0.45	1.03
Total HMW PAHs - 1/2MDL	3.90	26.8%	2.86	4.94
Total HMW PAHs - MDL	3.90	26.8%	2.86	4.94
Total HMW PAHs - Zero	3.90	26.8%	2.86	4.94
Total PAHs - 1/2MDL	4.15	29.6%	2.92	5.37
Total PAHs - MDL	4.15	29.5%	2.92	5.38
Total PAHs - Zero	4.14	29.6%	2.92	5.37
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-016			
	0.00-0.50			
	CFISS-016-SO-0-0.5			
	6/23/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.005	--	0.005	0.005
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.003	44.4%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.020
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.006	--	0.006	0.006
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.046	30.5%	0.032	0.060
Dibenzofuran	0.013	33.5%	0.009	0.017
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.004	--	0.004	0.004
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.047	--	0.047	0.047
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.019	--	0.019	0.019
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-016			
	0.50-2.00			
	CFISS-016-SO-0.5-2			
	6/28/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	13,200	4.58%	12,596	13,804
Antimony	0.12	70.4%	0.035	0.20
Arsenic	5.00	7.46%	4.63	5.37
Barium	105	9.24%	95.3	115
Beryllium	0.53	4.90%	0.50	0.56
Cadmium	0.085	6.03%	0.080	0.090
Chromium, Total	13.6	7.75%	12.5	14.7
Chromium, Hexavalent	0.36	7.75%	0.34	0.39
Chromium, Trivalent	13.2	7.75%	12.2	14.3
Cobalt	5.90	1.99%	5.78	6.02
Copper	17.0	4.63%	16.2	17.8
Iron	16,100	2.40%	15,713	16,487
Lead	10.6	3.33%	10.2	11.0
Manganese	459	7.15%	426	492
Mercury	0.018	27.4%	0.013	0.023
Nickel	13.5	6.58%	12.6	14.4
Selenium	1.80	19.1%	1.46	2.14
Silver	0.037	9.83%	0.033	0.041
Thallium	0.094	6.56%	0.088	0.10
Vanadium	11.1	3.31%	10.7	11.5
Zinc	47.5	5.42%	44.9	50.1
Other Inorganic Parameters (mg/kg)				
Cyanide	0.12	32.7%	0.081	0.16
Fluoride	36.8	28.8%	26.2	47.4
Essential Nutrients (mg/kg)				
Calcium	23,200	15.1%	19,687	26,713
Magnesium	12,500	2.18%	12,227	12,773
Potassium	1,130	6.91%	1,052	1,208
Sodium	54.4	21.1%	42.9	65.9
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-016			
	0.50-2.00			
	CFISS-016-SO-0.5-2			
	6/28/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.015	47.7%	0.008	0.022
Acenaphthene	0.036	80.9%	0.007	0.065
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.066	82.4%	0.012	0.12
Fluoranthene	0.49	71.4%	0.14	0.84
Fluorene	0.031	74.2%	0.008	0.054
Naphthalene	0.016	28.9%	0.011	0.021
Phenanthrene	0.46	78.1%	0.10	0.82
Total LMW PAHs - 1/2MDL	1.12	74.3%	0.29	1.95
Total LMW PAHs - MDL	1.12	74.3%	0.29	1.96
Total LMW PAHs - Zero	1.11	74.3%	0.29	1.94
Benzo(A)Pyrene	0.23	67.2%	0.075	0.38
Benzo(A)Anthracene	0.24	68.8%	0.075	0.41
Benzo(B)Fluoranthene	0.38	60.1%	0.15	0.61
Benzo(G,H,I)Perylene	0.25	60.8%	0.098	0.40
Benzo(K)Fluoranthene	0.14	64.5%	0.050	0.23
Chrysene	0.30	62.9%	0.11	0.49
Dibenz(A,H)Anthracene	0.068	63.9%	0.025	0.11
Indeno(1,2,3-C,D)Pyrene	0.25	62.0%	0.095	0.41
Pyrene	0.58	72.7%	0.16	1.00
Total HMW PAHs - 1/2MDL	2.44	64.7%	0.86	4.02
Total HMW PAHs - MDL	2.44	64.7%	0.86	4.02
Total HMW PAHs - Zero	2.44	64.7%	0.86	4.02
Total PAHs - 1/2MDL	3.16	68.3%	1.00	5.32
Total PAHs - MDL	3.17	68.3%	1.00	5.33
Total PAHs - Zero	3.16	68.3%	1.00	5.31
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-016			
	0.50-2.00			
	CFISS-016-SO-0.5-2			
	6/28/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.015	41.1%	0.009	0.021
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.049	76.1%	0.012	0.086
Dibenzofuran	0.030	70.0%	0.009	0.051
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.019	--	0.019	0.019
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.003	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-017			
	0.00-0.50			
	CFISS-017-SO-0-0.5			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	12,800	4.68%	12,201	13,399
Antimony	0.15	28.1%	0.11	0.19
Arsenic	4.30	13.8%	3.71	4.89
Barium	77.1	4.03%	74.0	80.2
Beryllium	0.48	6.32%	0.45	0.51
Cadmium	0.16	15.0%	0.14	0.18
Chromium, Total	15.0	10.6%	13.4	16.6
Chromium, Hexavalent	0.40	10.6%	0.36	0.44
Chromium, Trivalent	14.6	10.6%	13.1	16.1
Cobalt	5.60	3.51%	5.40	5.80
Copper	16.4	12.3%	14.4	18.4
Iron	14,700	3.40%	14,200	15,200
Lead	15.2	48.5%	7.83	22.6
Manganese	353	5.63%	333	373
Mercury	0.008	54.9%	0.004	0.012
Nickel	21.6	14.5%	18.5	24.7
Selenium	1.50	20.0%	1.20	1.80
Silver	0.046	9.03%	0.042	0.050
Thallium	0.085	14.4%	0.073	0.097
Vanadium	12.9	9.21%	11.7	14.1
Zinc	48.3	12.7%	42.2	54.4
Other Inorganic Parameters (mg/kg)				
Cyanide	0.16	40.2%	0.096	0.22
Fluoride	36.7	20.5%	29.2	44.2
Essential Nutrients (mg/kg)				
Calcium	24,700	10.7%	22,065	27,335
Magnesium	11,600	2.82%	11,273	11,927
Potassium	977	6.24%	916	1,038
Sodium	61.1	30.7%	42.3	79.9
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-017			
	0.00-0.50			
	CFISS-017-SO-0-0.5			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.80E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.80E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.018	47.1%	0.010	0.026
Acenaphthene	0.13	42.0%	0.075	0.18
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.25	37.7%	0.16	0.34
Fluoranthene	3.00	37.3%	1.88	4.12
Fluorene	0.095	34.6%	0.062	0.13
Naphthalene	0.049	44.9%	0.027	0.071
Phenanthrene	1.60	31.0%	1.10	2.10
Total LMW PAHs - 1/2MDL	5.15	35.8%	3.31	7.00
Total LMW PAHs - MDL	5.16	35.8%	3.31	7.00
Total LMW PAHs - Zero	5.14	35.9%	3.30	6.99
Benzo(A)Pyrene	2.10	36.1%	1.34	2.86
Benzo(A)Anthracene	1.60	32.0%	1.09	2.11
Benzo(B)Fluoranthene	2.70	29.8%	1.89	3.51
Benzo(G,H,I)Perylene	2.20	30.8%	1.52	2.88
Benzo(K)Fluoranthene	0.84	31.3%	0.58	1.10
Chrysene	2.30	35.9%	1.47	3.13
Dibenz(A,H)Anthracene	0.59	39.8%	0.36	0.82
Indeno(1,2,3-C,D)Pyrene	2.40	31.1%	1.65	3.15
Pyrene	2.20	39.3%	1.33	3.07
Total HMW PAHs - 1/2MDL	16.9	26.8%	12.4	21.5
Total HMW PAHs - MDL	16.9	26.8%	12.4	21.5
Total HMW PAHs - Zero	16.9	26.8%	12.4	21.5
Total PAHs - 1/2MDL	19.4	29.6%	13.6	25.1
Total PAHs - MDL	19.4	29.5%	13.6	25.1
Total PAHs - Zero	19.4	29.6%	13.6	25.1
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-017			
	0.00-0.50			
	CFISS-017-SO-0-0.5			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.015	--	0.015	0.015
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.026	--	0.026	0.026
Benzyl Butyl Phthalate	0.010	--	0.010	0.010
Biphenyl (Diphenyl)	0.029	49.7%	0.014	0.043
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.033	--	0.033	0.033
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.26	30.5%	0.18	0.34
Dibenzofuran	0.058	33.5%	0.039	0.077
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.086	--	0.086	0.086
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-017			
	0.50-2.00			
	CFISS-017-SO-0.5-2			
	6/23/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	12,100	4.58%	11,546	12,654
Antimony	0.12	70.4%	0.035	0.20
Arsenic	4.70	7.46%	4.35	5.05
Barium	109	9.24%	98.9	119
Beryllium	0.48	4.90%	0.46	0.50
Cadmium	0.054	6.03%	0.051	0.057
Chromium, Total	17.0	7.75%	15.7	18.3
Chromium, Hexavalent	0.45	7.75%	0.42	0.49
Chromium, Trivalent	16.5	7.75%	15.3	17.8
Cobalt	5.60	1.99%	5.49	5.71
Copper	14.1	4.63%	13.4	14.8
Iron	15,300	2.40%	14,933	15,667
Lead	9.40	3.33%	9.09	9.71
Manganese	444	7.15%	412	476
Mercury	0.018	27.4%	0.013	0.023
Nickel	14.0	6.58%	13.1	14.9
Selenium	1.70	19.1%	1.38	2.02
Silver	0.030	9.83%	0.027	0.033
Thallium	0.079	6.56%	0.074	0.084
Vanadium	11.0	3.31%	10.6	11.4
Zinc	44.4	5.42%	42.0	46.8
Other Inorganic Parameters (mg/kg)				
Cyanide	0.044	32.7%	0.030	0.058
Fluoride	28.6	28.8%	20.4	36.8
Essential Nutrients (mg/kg)				
Calcium	30,400	15.1%	25,797	35,003
Magnesium	12,700	2.18%	12,423	12,977
Potassium	1,020	6.91%	949	1,091
Sodium	58.0	21.1%	45.8	70.2
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-017			
	0.50-2.00			
	CFISS-017-SO-0.5-2			
	6/23/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.012	47.7%	0.006	0.018
Acenaphthene	0.004	80.9%	7.24E-04	0.007
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.015	82.4%	0.003	0.027
Fluoranthene	0.030	71.4%	0.009	0.051
Fluorene	0.003	74.2%	8.91E-04	0.006
Naphthalene	0.004	28.9%	0.003	0.005
Phenanthrene	0.026	78.1%	0.006	0.046
Total LMW PAHs - 1/2MDL	0.098	74.3%	0.025	0.17
Total LMW PAHs - MDL	0.13	74.3%	0.033	0.22
Total LMW PAHs - Zero	0.068	74.3%	0.018	0.12
Benzo(A)Pyrene	0.018	67.2%	0.006	0.030
Benzo(A)Anthracene	0.013	68.8%	0.004	0.022
Benzo(B)Fluoranthene	0.022	60.1%	0.009	0.035
Benzo(G,H,I)Perylene	0.025	60.8%	0.010	0.040
Benzo(K)Fluoranthene	0.015	64.5%	0.005	0.025
Chrysene	0.022	62.9%	0.008	0.036
Dibenz(A,H)Anthracene	0.008	63.9%	0.003	0.013
Indeno(1,2,3-C,D)Pyrene	0.011	62.0%	0.004	0.017
Pyrene	0.026	72.7%	0.007	0.045
Total HMW PAHs - 1/2MDL	0.16	64.7%	0.056	0.26
Total HMW PAHs - MDL	0.19	64.7%	0.067	0.31
Total HMW PAHs - Zero	0.13	64.7%	0.045	0.21
Total PAHs - 1/2MDL	0.22	68.3%	0.071	0.38
Total PAHs - MDL	0.29	68.3%	0.090	0.48
Total PAHs - Zero	0.16	68.3%	0.051	0.27
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.042	--	0.042	0.042
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-017			
	0.50-2.00			
	CFISS-017-SO-0.5-2			
	6/23/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.005	--	0.005	0.005
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.042	--	0.042	0.042
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.009	41.1%	0.005	0.012
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.006
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.006	--	0.006	0.006
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.004	76.1%	9.32E-04	0.007
Dibenzofuran	0.005	70.0%	0.001	0.008
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.004	--	0.004	0.004
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.037	32.5%	0.025	0.049
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.019	--	0.019	0.019
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-018			
	0.00-0.50			
	CFISS-018-SO-0-0.5			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	11,400	4.68%	10,866	11,934
Antimony	0.18	28.1%	0.13	0.23
Arsenic	4.20	13.8%	3.62	4.78
Barium	59.4	4.03%	57.0	61.8
Beryllium	0.52	6.32%	0.49	0.55
Cadmium	0.18	15.0%	0.15	0.21
Chromium, Total	18.6	10.6%	16.6	20.6
Chromium, Hexavalent	0.50	10.6%	0.45	0.55
Chromium, Trivalent	18.1	10.6%	16.2	20.0
Cobalt	5.50	3.51%	5.31	5.69
Copper	15.8	12.3%	13.9	17.7
Iron	13,900	3.40%	13,427	14,373
Lead	13.5	48.5%	6.95	20.0
Manganese	341	5.63%	322	360
Mercury	0.017	54.9%	0.008	0.026
Nickel	29.8	14.5%	25.5	34.1
Selenium	1.40	20.0%	1.12	1.68
Silver	0.046	9.03%	0.042	0.050
Thallium	0.085	14.4%	0.073	0.097
Vanadium	13.7	9.21%	12.4	15.0
Zinc	48.8	12.7%	42.6	55.0
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	40.2%	0.090	0.21
Fluoride	72.9	20.5%	57.9	87.9
Essential Nutrients (mg/kg)				
Calcium	30,400	10.7%	27,157	33,643
Magnesium	11,600	2.82%	11,273	11,927
Potassium	825	6.24%	774	876
Sodium	79.9	30.7%	55.3	104
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.70E-04	--	4.70E-04	4.70E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-018			
	0.00-0.50			
	CFISS-018-SO-0-0.5			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.010	47.1%	0.005	0.014
Acenaphthene	0.073	42.0%	0.042	0.10
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.13	37.7%	0.081	0.18
Fluoranthene	1.70	37.3%	1.07	2.33
Fluorene	0.041	34.6%	0.027	0.055
Naphthalene	0.016	44.9%	0.009	0.023
Phenanthrene	0.86	31.0%	0.59	1.13
Total LMW PAHs - 1/2MDL	2.83	35.8%	1.82	3.85
Total LMW PAHs - MDL	2.84	35.8%	1.82	3.85
Total LMW PAHs - Zero	2.83	35.9%	1.81	3.84
Benzo(A)Pyrene	1.30	36.1%	0.83	1.77
Benzo(A)Anthracene	1.10	32.0%	0.75	1.45
Benzo(B)Fluoranthene	2.00	29.8%	1.40	2.60
Benzo(G,H,I)Perylene	1.90	30.8%	1.32	2.48
Benzo(K)Fluoranthene	0.67	31.3%	0.46	0.88
Chrysene	1.50	35.9%	0.96	2.04
Dibenz(A,H)Anthracene	0.42	39.8%	0.25	0.59
Indeno(1,2,3-C,D)Pyrene	1.70	31.1%	1.17	2.23
Pyrene	1.60	39.3%	0.97	2.23
Total HMW PAHs - 1/2MDL	12.2	26.8%	8.92	15.5
Total HMW PAHs - MDL	12.2	26.8%	8.92	15.5
Total HMW PAHs - Zero	12.2	26.8%	8.92	15.5
Total PAHs - 1/2MDL	13.0	29.6%	9.17	16.9
Total PAHs - MDL	13.0	29.5%	9.17	16.9
Total PAHs - Zero	13.0	29.6%	9.16	16.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-018			
	0.00-0.50			
	CFISS-018-SO-0-0.5			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.15	30.5%	0.10	0.20
Dibenzofuran	0.023	33.5%	0.015	0.031
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-018			
	0.50-2.00			
	CFISS-018-SO-0.5-2			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	8,620	4.58%	8,226	9,014
Antimony	0.092	70.4%	0.027	0.16
Arsenic	4.90	7.46%	4.53	5.27
Barium	74.8	9.24%	67.9	81.7
Beryllium	0.40	4.90%	0.38	0.42
Cadmium	0.081	6.03%	0.076	0.086
Chromium, Total	17.8	7.75%	16.4	19.2
Chromium, Hexavalent	0.48	7.75%	0.44	0.51
Chromium, Trivalent	17.3	7.75%	16.0	18.7
Cobalt	5.50	1.99%	5.39	5.61
Copper	15.9	4.63%	15.2	16.6
Iron	14,100	2.40%	13,762	14,438
Lead	8.60	3.33%	8.31	8.89
Manganese	386	7.15%	358	414
Mercury	0.028	27.4%	0.020	0.036
Nickel	15.2	6.58%	14.2	16.2
Selenium	1.50	19.1%	1.21	1.79
Silver	0.030	9.83%	0.027	0.033
Thallium	0.060	6.56%	0.056	0.064
Vanadium	8.60	3.31%	8.32	8.88
Zinc	51.3	5.42%	48.5	54.1
Other Inorganic Parameters (mg/kg)				
Cyanide	0.017	32.7%	0.011	0.023
Fluoride	16.6	28.8%	11.8	21.4
Essential Nutrients (mg/kg)				
Calcium	32,400	15.1%	27,494	37,306
Magnesium	11,900	2.18%	11,640	12,160
Potassium	721	6.91%	671	771
Sodium	46.1	21.1%	36.4	55.8
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-018			
	0.50-2.00			
	CFISS-018-SO-0.5-2			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.7%	0.002	0.005
Acenaphthene	0.008	80.9%	0.002	0.014
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.016	82.4%	0.003	0.028
Fluoranthene	0.16	71.4%	0.046	0.27
Fluorene	0.004	74.2%	9.30E-04	0.006
Naphthalene	0.004	28.9%	0.003	0.005
Phenanthrene	0.12	78.1%	0.026	0.21
Total LMW PAHs - 1/2MDL	0.32	74.3%	0.082	0.56
Total LMW PAHs - MDL	0.35	74.3%	0.090	0.61
Total LMW PAHs - Zero	0.29	74.3%	0.074	0.50
Benzo(A)Pyrene	0.095	67.2%	0.031	0.16
Benzo(A)Anthracene	0.091	68.8%	0.028	0.15
Benzo(B)Fluoranthene	0.15	60.1%	0.060	0.24
Benzo(G,H,I)Perylene	0.097	60.8%	0.038	0.16
Benzo(K)Fluoranthene	0.053	64.5%	0.019	0.087
Chrysene	0.12	62.9%	0.044	0.20
Dibenz(A,H)Anthracene	0.027	63.9%	0.010	0.044
Indeno(1,2,3-C,D)Pyrene	0.10	62.0%	0.038	0.16
Pyrene	0.19	72.7%	0.052	0.33
Total HMW PAHs - 1/2MDL	0.92	64.7%	0.33	1.52
Total HMW PAHs - MDL	0.92	64.7%	0.33	1.52
Total HMW PAHs - Zero	0.92	64.7%	0.33	1.52
Total PAHs - 1/2MDL	1.09	68.3%	0.34	1.83
Total PAHs - MDL	1.12	68.3%	0.35	1.88
Total PAHs - Zero	1.06	68.3%	0.34	1.79
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-018			
	0.50-2.00			
	CFISS-018-SO-0.5-2			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.012	76.1%	0.003	0.021
Dibenzofuran	0.005	70.0%	0.001	0.009
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-019			
	0.00-0.50			
	CFISS-019-SO-0-0.5			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,700	4.68%	14,965	16,435
Antimony	0.31	28.1%	0.22	0.40
Arsenic	5.10	13.8%	4.39	5.81
Barium	92.9	4.03%	89.2	96.6
Beryllium	0.60	6.32%	0.56	0.64
Cadmium	0.27	15.0%	0.23	0.31
Chromium, Total	17.9	10.6%	16.0	19.8
Chromium, Hexavalent	0.48	10.6%	0.43	0.53
Chromium, Trivalent	17.4	10.6%	15.6	19.3
Cobalt	6.00	3.51%	5.79	6.21
Copper	21.9	12.3%	19.2	24.6
Iron	14,900	3.40%	14,393	15,407
Lead	20.6	48.5%	10.6	30.6
Manganese	381	5.63%	360	402
Mercury	0.026	54.9%	0.012	0.040
Nickel	35.4	14.5%	30.3	40.5
Selenium	1.30	20.0%	1.04	1.56
Silver	0.058	9.03%	0.053	0.063
Thallium	0.083	14.4%	0.071	0.095
Vanadium	17.1	9.21%	15.5	18.7
Zinc	64.8	12.7%	56.6	73.0
Other Inorganic Parameters (mg/kg)				
Cyanide	0.22	40.2%	0.13	0.31
Fluoride	215	20.5%	171	259
Essential Nutrients (mg/kg)				
Calcium	25,800	10.7%	23,048	28,552
Magnesium	10,900	2.82%	10,593	11,207
Potassium	1,040	6.24%	975	1,105
Sodium	673	30.7%	466	880
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-019			
	0.00-0.50			
	CFISS-019-SO-0-0.5			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.040	47.1%	0.021	0.059
Acenaphthene	0.25	42.0%	0.15	0.35
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.44	37.7%	0.27	0.61
Fluoranthene	4.50	37.3%	2.82	6.18
Fluorene	0.15	34.6%	0.098	0.20
Naphthalene	0.070	44.9%	0.039	0.10
Phenanthrene	2.40	31.0%	1.66	3.14
Total LMW PAHs - 1/2MDL	7.85	35.8%	5.04	10.7
Total LMW PAHs - MDL	7.86	35.8%	5.05	10.7
Total LMW PAHs - Zero	7.85	35.9%	5.03	10.7
Benzo(A)Pyrene	3.40	36.1%	2.17	4.63
Benzo(A)Anthracene	2.80	32.0%	1.90	3.70
Benzo(B)Fluoranthene	4.30	29.8%	3.02	5.58
Benzo(G,H,I)Perylene	4.10	30.8%	2.84	5.36
Benzo(K)Fluoranthene	1.60	31.3%	1.10	2.10
Chrysene	3.40	35.9%	2.18	4.62
Dibenz(A,H)Anthracene	1.00	39.8%	0.60	1.40
Indeno(1,2,3-C,D)Pyrene	4.00	31.1%	2.76	5.24
Pyrene	3.80	39.3%	2.31	5.29
Total HMW PAHs - 1/2MDL	28.4	26.8%	20.8	36.0
Total HMW PAHs - MDL	28.4	26.8%	20.8	36.0
Total HMW PAHs - Zero	28.4	26.8%	20.8	36.0
Total PAHs - 1/2MDL	31.9	29.6%	22.5	41.3
Total PAHs - MDL	31.9	29.5%	22.5	41.3
Total PAHs - Zero	31.9	29.6%	22.5	41.3
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-019			
	0.00-0.50			
	CFISS-019-SO-0-0.5			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.37	30.5%	0.26	0.48
Dibenzofuran	0.090	33.5%	0.060	0.12
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.022	--	0.022	0.022
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-019			
	0.50-2.00			
	CFISS-019-SO-0.5-2			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	11,700	4.58%	11,165	12,235
Antimony	0.25	70.4%	0.074	0.43
Arsenic	4.90	7.46%	4.53	5.27
Barium	119	9.24%	108	130
Beryllium	0.49	4.90%	0.47	0.51
Cadmium	0.13	6.03%	0.12	0.14
Chromium, Total	22.9	7.75%	21.1	24.7
Chromium, Hexavalent	0.61	7.75%	0.57	0.66
Chromium, Trivalent	22.3	7.75%	20.6	24.0
Cobalt	6.10	1.99%	5.98	6.22
Copper	25.2	4.63%	24.0	26.4
Iron	14,900	2.40%	14,542	15,258
Lead	14.9	3.33%	14.4	15.4
Manganese	447	7.15%	415	479
Mercury	0.027	27.4%	0.020	0.034
Nickel	19.1	6.58%	17.8	20.4
Selenium	1.60	19.1%	1.29	1.91
Silver	0.055	9.83%	0.050	0.060
Thallium	0.075	6.56%	0.070	0.080
Vanadium	12.3	3.31%	11.9	12.7
Zinc	54.3	5.42%	51.4	57.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.073	32.7%	0.049	0.097
Fluoride	70.5	28.8%	50.2	90.8
Essential Nutrients (mg/kg)				
Calcium	24,300	15.1%	20,621	27,979
Magnesium	11,600	2.18%	11,347	11,853
Potassium	1,020	6.91%	949	1,091
Sodium	71.3	21.1%	56.3	86.3
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-019			
	0.50-2.00			
	CFISS-019-SO-0.5-2			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.081	47.7%	0.042	0.12
Acenaphthene	0.42	80.9%	0.080	0.76
Acenaphthylene	0.009	62.8%	0.003	0.014
Anthracene	0.73	82.4%	0.13	1.33
Fluoranthene	3.30	71.4%	0.94	5.66
Fluorene	0.34	74.2%	0.088	0.59
Naphthalene	0.18	28.9%	0.13	0.23
Phenanthrene	2.80	78.1%	0.61	4.99
Total LMW PAHs - 1/2MDL	7.86	74.3%	2.02	13.7
Total LMW PAHs - MDL	7.87	74.3%	2.02	13.7
Total LMW PAHs - Zero	7.85	74.3%	2.02	13.7
Benzo(A)Pyrene	2.30	67.2%	0.75	3.85
Benzo(A)Anthracene	1.90	68.8%	0.59	3.21
Benzo(B)Fluoranthene	2.70	60.1%	1.08	4.32
Benzo(G,H,I)Perylene	1.70	60.8%	0.67	2.73
Benzo(K)Fluoranthene	0.98	64.5%	0.35	1.61
Chrysene	2.40	62.9%	0.89	3.91
Dibenz(A,H)Anthracene	0.54	63.9%	0.20	0.88
Indeno(1,2,3-C,D)Pyrene	2.00	62.0%	0.76	3.24
Pyrene	2.60	72.7%	0.71	4.49
Total HMW PAHs - 1/2MDL	17.1	64.7%	6.04	28.2
Total HMW PAHs - MDL	17.1	64.7%	6.04	28.2
Total HMW PAHs - Zero	17.1	64.7%	6.04	28.2
Total PAHs - 1/2MDL	22.2	68.3%	7.03	37.4
Total PAHs - MDL	22.2	68.3%	7.03	37.4
Total PAHs - Zero	22.2	68.3%	7.03	37.4
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-019			
	0.50-2.00			
	CFISS-019-SO-0.5-2			
	6/24/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	41.1%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.010	32.7%	0.007	0.013
Biphenyl (Diphenyl)	0.028	98.2%	5.04E-04	0.055
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.39	76.1%	0.093	0.69
Dibenzofuran	0.23	70.0%	0.069	0.39
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	32.5%	0.005	0.009
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-020			
	0.00-0.50			
	CFISS-020-SO-0-0.5			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	14,300	4.68%	13,630	14,970
Antimony	0.26	28.1%	0.19	0.33
Arsenic	4.80	13.8%	4.14	5.46
Barium	93.8	4.03%	90.0	97.6
Beryllium	0.56	6.32%	0.52	0.60
Cadmium	0.26	15.0%	0.22	0.30
Chromium, Total	19.3	10.6%	17.3	21.3
Chromium, Hexavalent	0.52	10.6%	0.46	0.57
Chromium, Trivalent	18.8	10.6%	16.8	20.8
Cobalt	5.80	3.51%	5.60	6.00
Copper	25.8	12.3%	22.6	29.0
Iron	16,400	3.40%	15,843	16,957
Lead	21.7	48.5%	11.2	32.2
Manganese	393	5.63%	371	415
Mercury	0.024	54.9%	0.011	0.037
Nickel	30.8	14.5%	26.3	35.3
Selenium	1.50	20.0%	1.20	1.80
Silver	0.17	9.03%	0.15	0.19
Thallium	0.090	14.4%	0.077	0.10
Vanadium	17.0	9.21%	15.4	18.6
Zinc	79.4	12.7%	69.3	89.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.25	40.2%	0.15	0.35
Fluoride	61.2	20.5%	48.6	73.8
Essential Nutrients (mg/kg)				
Calcium	30,600	10.7%	27,336	33,864
Magnesium	11,600	2.82%	11,273	11,927
Potassium	1,170	6.24%	1,097	1,243
Sodium	272	30.7%	188	356
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-020			
	0.00-0.50			
	CFISS-020-SO-0-0.5			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.079	140%	-3.13E-02	0.19
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.079	140%	-3.13E-02	0.19
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	1.30	47.1%	0.69	1.91
Acenaphthene	5.40	42.0%	3.13	7.67
Acenaphthylene	0.20	36.1%	0.13	0.27
Anthracene	8.50	37.7%	5.30	11.7
Fluoranthene	39.0	37.3%	24.5	53.5
Fluorene	4.10	34.6%	2.68	5.52
Naphthalene	2.20	44.9%	1.21	3.19
Phenanthrene	32.0	31.0%	22.1	41.9
Total LMW PAHs - 1/2MDL	92.7	35.8%	59.5	126
Total LMW PAHs - MDL	92.7	35.8%	59.5	126
Total LMW PAHs - Zero	92.7	35.9%	59.4	126
Benzo(A)Pyrene	24.0	36.1%	15.3	32.7
Benzo(A)Anthracene	23.0	32.0%	15.6	30.4
Benzo(B)Fluoranthene	30.0	29.8%	21.0	39.0
Benzo(G,H,I)Perylene	21.0	30.8%	14.5	27.5
Benzo(K)Fluoranthene	12.0	31.3%	8.25	15.8
Chrysene	25.0	35.9%	16.0	34.0
Dibenz(A,H)Anthracene	6.20	39.8%	3.73	8.67
Indeno(1,2,3-C,D)Pyrene	22.0	31.1%	15.2	28.8
Pyrene	40.0	39.3%	24.3	55.7
Total HMW PAHs - 1/2MDL	203	26.8%	149	258
Total HMW PAHs - MDL	203	26.8%	149	258
Total HMW PAHs - Zero	203	26.8%	149	258
Total PAHs - 1/2MDL	265	29.6%	186	343
Total PAHs - MDL	265	29.5%	186	343
Total PAHs - Zero	265	29.6%	186	343
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.13	--	0.13	0.13
1,4-Dioxane (P-Dioxane)	0.44	--	0.44	0.44
2,3,4,6-Tetrachlorophenol	0.16	--	0.16	0.16
2,4,5-Trichlorophenol	0.17	--	0.17	0.17
2,4,6-Trichlorophenol	0.047	--	0.047	0.047
2,4-Dichlorophenol	0.039	--	0.039	0.039
2,4-Dimethylphenol	0.37	--	0.37	0.37

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-020			
	0.00-0.50			
	CFISS-020-SO-0-0.5			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.25	--	1.25	1.25
2,4-Dinitrotoluene	0.065	--	0.065	0.065
2,6-Dinitrotoluene	0.090	--	0.090	0.090
2-Chloronaphthalene	0.038	--	0.038	0.038
2-Chlorophenol	0.042	--	0.042	0.042
2-Methylphenol (O-Cresol)	0.070	--	0.070	0.070
2-Nitroaniline	0.055	--	0.055	0.055
2-Nitrophenol	0.055	--	0.055	0.055
3- And 4- Methylphenol (Total)	0.044	--	0.044	0.044
3,3'-Dichlorobenzidine	0.19	--	0.19	0.19
3-Nitroaniline	0.049	--	0.049	0.049
4,6-Dinitro-2-Methylphenol	0.44	--	0.44	0.44
4-Bromophenyl Phenyl Ether	0.050	--	0.050	0.050
4-Chloro-3-Methylphenol	0.070	--	0.070	0.070
4-Chloroaniline	0.043	--	0.043	0.043
4-Chlorophenyl Phenyl Ether	0.050	--	0.050	0.050
4-Nitroaniline	0.060	--	0.060	0.060
4-Nitrophenol	0.80	--	0.80	0.80
Acetophenone	0.036	44.4%	0.020	0.052
Atrazine	0.075	--	0.075	0.075
Benzaldehyde	0.13	--	0.13	0.13
Benzyl Butyl Phthalate	0.050	--	0.050	0.050
Biphenyl (Diphenyl)	0.31	49.7%	0.16	0.46
Bis(2-Chloroethoxy) Methane	0.050	--	0.050	0.050
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.039	--	0.039	0.039
Bis(2-Chloroisopropyl) Ether	0.070	--	0.070	0.070
Bis(2-Ethylhexyl) Phthalate	0.81	--	0.81	0.81
Caprolactam	0.12	--	0.12	0.12
Carbazole	4.30	30.5%	2.99	5.61
Dibenzofuran	2.30	33.5%	1.53	3.07
Diethyl Phthalate	0.047	--	0.047	0.047
Dimethyl Phthalate	0.048	--	0.048	0.048
Di-N-Butyl Phthalate	0.050	--	0.050	0.050
Di-N-Octylphthalate	0.085	--	0.085	0.085
Hexachlorobenzene	0.065	--	0.065	0.065
Hexachlorobutadiene	0.047	--	0.047	0.047
Hexachlorocyclopentadiene	0.11	--	0.11	0.11
Hexachloroethane	0.060	--	0.060	0.060
Isophorone	0.036	--	0.036	0.036
Nitrobenzene	0.050	--	0.050	0.050
N-Nitrosodi-N-Propylamine	0.055	--	0.055	0.055
N-Nitrosodiphenylamine	0.15	--	0.15	0.15
Pentachlorophenol	0.20	--	0.20	0.20
Phenol	0.055	--	0.055	0.055

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-020			
	0.50-2.00			
	CFISS-020-SO-0.5-2			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	10,700	4.58%	10,210	11,190
Antimony	0.14	70.4%	0.041	0.24
Arsenic	5.00	7.46%	4.63	5.37
Barium	99.4	9.24%	90.2	109
Beryllium	0.44	4.90%	0.42	0.46
Cadmium	0.24	6.03%	0.23	0.25
Chromium, Total	14.8	7.75%	13.7	15.9
Chromium, Hexavalent	0.40	7.75%	0.37	0.43
Chromium, Trivalent	14.4	7.75%	13.3	15.5
Cobalt	5.90	1.99%	5.78	6.02
Copper	20.0	4.63%	19.1	20.9
Iron	15,900	2.40%	15,518	16,282
Lead	15.2	3.33%	14.7	15.7
Manganese	475	7.15%	441	509
Mercury	0.017	27.4%	0.012	0.022
Nickel	13.9	6.58%	13.0	14.8
Selenium	1.50	19.1%	1.21	1.79
Silver	0.19	9.83%	0.17	0.21
Thallium	0.095	6.56%	0.089	0.10
Vanadium	10.3	3.31%	9.96	10.6
Zinc	75.3	5.42%	71.2	79.4
Other Inorganic Parameters (mg/kg)				
Cyanide	0.077	32.7%	0.052	0.10
Fluoride	36.7	28.8%	26.1	47.3
Essential Nutrients (mg/kg)				
Calcium	25,900	15.1%	21,979	29,821
Magnesium	11,600	2.18%	11,347	11,853
Potassium	805	6.91%	749	861
Sodium	71.1	21.1%	56.1	86.1
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-020			
	0.50-2.00			
	CFISS-020-SO-0.5-2			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.16	29.2%	0.11	0.21
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.16	29.2%	0.11	0.21
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.43	47.7%	0.22	0.64
Acenaphthene	2.30	80.9%	0.44	4.16
Acenaphthylene	0.10	62.8%	0.037	0.16
Anthracene	4.20	82.4%	0.74	7.66
Fluoranthene	22.0	71.4%	6.29	37.7
Fluorene	1.70	74.2%	0.44	2.96
Naphthalene	0.87	28.9%	0.62	1.12
Phenanthrene	17.0	78.1%	3.72	30.3
Total LMW PAHs - 1/2MDL	48.6	74.3%	12.5	84.7
Total LMW PAHs - MDL	48.6	74.3%	12.5	84.7
Total LMW PAHs - Zero	48.6	74.3%	12.5	84.7
Benzo(A)Pyrene	11.0	67.2%	3.60	18.4
Benzo(A)Anthracene	12.0	68.8%	3.75	20.3
Benzo(B)Fluoranthene	13.0	60.1%	5.19	20.8
Benzo(G,H,I)Perylene	6.20	60.8%	2.43	9.97
Benzo(K)Fluoranthene	4.90	64.5%	1.74	8.06
Chrysene	12.0	62.9%	4.45	19.6
Dibenz(A,H)Anthracene	2.40	63.9%	0.87	3.93
Indeno(1,2,3-C,D)Pyrene	8.00	62.0%	3.04	13.0
Pyrene	15.0	72.7%	4.09	25.9
Total HMW PAHs - 1/2MDL	84.5	64.7%	29.8	139
Total HMW PAHs - MDL	84.5	64.7%	29.8	139
Total HMW PAHs - Zero	84.5	64.7%	29.8	139
Total PAHs - 1/2MDL	120	68.3%	37.9	201
Total PAHs - MDL	120	68.3%	37.9	201
Total PAHs - Zero	120	68.3%	37.9	201
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.12	--	0.12	0.12
1,4-Dioxane (P-Dioxane)	0.43	--	0.43	0.43
2,3,4,6-Tetrachlorophenol	0.15	--	0.15	0.15
2,4,5-Trichlorophenol	0.16	--	0.16	0.16
2,4,6-Trichlorophenol	0.045	--	0.045	0.045
2,4-Dichlorophenol	0.038	--	0.038	0.038
2,4-Dimethylphenol	0.35	--	0.35	0.35

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-020			
	0.50-2.00			
	CFISS-020-SO-0.5-2			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.20	--	1.20	1.20
2,4-Dinitrotoluene	0.065	--	0.065	0.065
2,6-Dinitrotoluene	0.085	--	0.085	0.085
2-Chloronaphthalene	0.036	--	0.036	0.036
2-Chlorophenol	0.041	--	0.041	0.041
2-Methylphenol (O-Cresol)	0.070	--	0.070	0.070
2-Nitroaniline	0.050	--	0.050	0.050
2-Nitrophenol	0.055	--	0.055	0.055
3- And 4- Methylphenol (Total)	0.043	--	0.043	0.043
3,3'-Dichlorobenzidine	0.18	--	0.18	0.18
3-Nitroaniline	0.047	--	0.047	0.047
4,6-Dinitro-2-Methylphenol	0.43	--	0.43	0.43
4-Bromophenyl Phenyl Ether	0.050	--	0.050	0.050
4-Chloro-3-Methylphenol	0.070	--	0.070	0.070
4-Chloroaniline	0.041	--	0.041	0.041
4-Chlorophenyl Phenyl Ether	0.048	--	0.048	0.048
4-Nitroaniline	0.060	--	0.060	0.060
4-Nitrophenol	0.75	--	0.75	0.75
Acetophenone	0.035	41.1%	0.020	0.049
Atrazine	0.070	--	0.070	0.070
Benzaldehyde	0.12	--	0.12	0.12
Benzyl Butyl Phthalate	0.049	32.7%	0.033	0.065
Biphenyl (Diphenyl)	0.14	98.2%	0.002	0.27
Bis(2-Chloroethoxy) Methane	0.050	--	0.050	0.050
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.038	--	0.038	0.038
Bis(2-Chloroisopropyl) Ether	0.065	--	0.065	0.065
Bis(2-Ethylhexyl) Phthalate	0.060	--	0.060	0.060
Caprolactam	0.12	--	0.12	0.12
Carbazole	2.40	76.1%	0.57	4.23
Dibenzofuran	1.10	70.0%	0.33	1.87
Diethyl Phthalate	0.045	--	0.045	0.045
Dimethyl Phthalate	0.046	--	0.046	0.046
Di-N-Butyl Phthalate	0.048	--	0.048	0.048
Di-N-Octylphthalate	0.080	--	0.080	0.080
Hexachlorobenzene	0.065	--	0.065	0.065
Hexachlorobutadiene	0.045	--	0.045	0.045
Hexachlorocyclopentadiene	0.10	--	0.10	0.10
Hexachloroethane	0.060	--	0.060	0.060
Isophorone	0.034	32.5%	0.023	0.045
Nitrobenzene	0.050	--	0.050	0.050
N-Nitrosodi-N-Propylamine	0.055	--	0.055	0.055
N-Nitrosodiphenylamine	0.15	--	0.15	0.15
Pentachlorophenol	0.19	--	0.19	0.19
Phenol	0.050	--	0.050	0.050

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-021			
	0.00-0.50			
	CFISS-021-SO-0-0.5			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	22,600	4.68%	21,542	23,658
Antimony	0.63	28.1%	0.45	0.81
Arsenic	8.20	13.8%	7.07	9.33
Barium	113	4.03%	108	118
Beryllium	0.91	6.32%	0.85	0.97
Cadmium	0.97	15.0%	0.82	1.12
Chromium, Total	31.1	10.6%	27.8	34.4
Chromium, Hexavalent	0.83	10.6%	0.74	0.92
Chromium, Trivalent	30.3	10.6%	27.1	33.5
Cobalt	7.70	3.51%	7.43	7.97
Copper	44.0	12.3%	38.6	49.4
Iron	24,500	3.40%	23,667	25,333
Lead	46.5	48.5%	23.9	69.1
Manganese	499	5.63%	471	527
Mercury	0.028	54.9%	0.013	0.043
Nickel	93.6	14.5%	80.0	107
Selenium	3.80	20.0%	3.04	4.56
Silver	0.12	9.03%	0.11	0.13
Thallium	0.17	14.4%	0.15	0.19
Vanadium	35.3	9.21%	32.0	38.6
Zinc	103	12.7%	89.9	116
Other Inorganic Parameters (mg/kg)				
Cyanide	0.56	40.2%	0.33	0.79
Fluoride	251	20.5%	199	303
Essential Nutrients (mg/kg)				
Calcium	20,300	10.7%	18,135	22,465
Magnesium	11,100	2.82%	10,787	11,413
Potassium	1,600	6.24%	1,500	1,700
Sodium	1,200	30.7%	831	1,569
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-021			
	0.00-0.50			
	CFISS-021-SO-0-0.5			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.80E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.80E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.035	47.1%	0.019	0.051
Acenaphthene	0.21	42.0%	0.12	0.30
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.30	37.7%	0.19	0.41
Fluoranthene	4.50	37.3%	2.82	6.18
Fluorene	0.14	34.6%	0.091	0.19
Naphthalene	0.070	44.9%	0.039	0.10
Phenanthrene	2.10	31.0%	1.45	2.75
Total LMW PAHs - 1/2MDL	7.36	35.8%	4.73	10.0
Total LMW PAHs - MDL	7.37	35.8%	4.73	10.0
Total LMW PAHs - Zero	7.36	35.9%	4.72	9.99
Benzo(A)Pyrene	2.90	36.1%	1.85	3.95
Benzo(A)Anthracene	2.60	32.0%	1.77	3.43
Benzo(B)Fluoranthene	7.50	29.8%	5.26	9.74
Benzo(G,H,I)Perylene	4.70	30.8%	3.25	6.15
Benzo(K)Fluoranthene	2.40	31.3%	1.65	3.15
Chrysene	5.30	35.9%	3.40	7.20
Dibenz(A,H)Anthracene	1.60	39.8%	0.96	2.24
Indeno(1,2,3-C,D)Pyrene	4.80	31.1%	3.31	6.29
Pyrene	4.60	39.3%	2.79	6.41
Total HMW PAHs - 1/2MDL	36.4	26.8%	26.6	46.2
Total HMW PAHs - MDL	36.4	26.8%	26.6	46.2
Total HMW PAHs - Zero	36.4	26.8%	26.6	46.2
Total PAHs - 1/2MDL	36.2	29.6%	25.5	46.9
Total PAHs - MDL	36.2	29.5%	25.5	46.9
Total PAHs - Zero	36.2	29.6%	25.5	46.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-021			
	0.00-0.50			
	CFISS-021-SO-0-0.5			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.43	--	0.43	0.43
Biphenyl (Diphenyl)	0.028	49.7%	0.014	0.042
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.086	--	0.086	0.086
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.41	30.5%	0.28	0.54
Dibenzofuran	0.071	33.5%	0.047	0.095
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-021			
	0.50-2.00			
	CFISS-021-SO-0.5-2			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	12,500	4.58%	11,928	13,072
Antimony	0.16	70.4%	0.047	0.27
Arsenic	5.10	7.46%	4.72	5.48
Barium	113	9.24%	103	123
Beryllium	0.53	4.90%	0.50	0.56
Cadmium	0.15	6.03%	0.14	0.16
Chromium, Total	22.1	7.75%	20.4	23.8
Chromium, Hexavalent	0.59	7.75%	0.55	0.64
Chromium, Trivalent	21.5	7.75%	19.8	23.2
Cobalt	6.10	1.99%	5.98	6.22
Copper	21.7	4.63%	20.7	22.7
Iron	17,200	2.40%	16,787	17,613
Lead	15.3	3.33%	14.8	15.8
Manganese	477	7.15%	443	511
Mercury	0.026	27.4%	0.019	0.033
Nickel	20.5	6.58%	19.2	21.8
Selenium	1.80	19.1%	1.46	2.14
Silver	0.050	9.83%	0.045	0.055
Thallium	0.083	6.56%	0.078	0.088
Vanadium	12.1	3.31%	11.7	12.5
Zinc	73.8	5.42%	69.8	77.8
Other Inorganic Parameters (mg/kg)				
Cyanide	0.36	32.7%	0.24	0.48
Fluoride	136	28.8%	96.9	175
Essential Nutrients (mg/kg)				
Calcium	22,200	15.1%	18,839	25,561
Magnesium	11,100	2.18%	10,858	11,342
Potassium	1,040	6.91%	968	1,112
Sodium	288	21.1%	227	349
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-021			
	0.50-2.00			
	CFISS-021-SO-0.5-2			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.003	47.7%	0.002	0.005
Acenaphthene	0.033	80.9%	0.006	0.060
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.24	82.4%	0.042	0.44
Fluoranthene	0.49	71.4%	0.14	0.84
Fluorene	0.031	74.2%	0.008	0.054
Naphthalene	0.010	28.9%	0.007	0.013
Phenanthrene	0.31	78.1%	0.068	0.55
Total LMW PAHs - 1/2MDL	1.12	74.3%	0.29	1.95
Total LMW PAHs - MDL	1.13	74.3%	0.29	1.97
Total LMW PAHs - Zero	1.11	74.3%	0.29	1.94
Benzo(A)Pyrene	0.30	67.2%	0.098	0.50
Benzo(A)Anthracene	0.27	68.8%	0.084	0.46
Benzo(B)Fluoranthene	0.43	60.1%	0.17	0.69
Benzo(G,H,I)Perylene	0.30	60.8%	0.12	0.48
Benzo(K)Fluoranthene	0.14	64.5%	0.050	0.23
Chrysene	0.44	62.9%	0.16	0.72
Dibenz(A,H)Anthracene	0.079	63.9%	0.029	0.13
Indeno(1,2,3-C,D)Pyrene	0.36	62.0%	0.14	0.58
Pyrene	0.50	72.7%	0.14	0.86
Total HMW PAHs - 1/2MDL	2.82	64.7%	0.99	4.64
Total HMW PAHs - MDL	2.82	64.7%	0.99	4.64
Total HMW PAHs - Zero	2.82	64.7%	0.99	4.64
Total PAHs - 1/2MDL	3.51	68.3%	1.11	5.90
Total PAHs - MDL	3.51	68.3%	1.11	5.91
Total PAHs - Zero	3.50	68.3%	1.11	5.90
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.042	--	0.042	0.042
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.004	--	0.004	0.004
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-021			
	0.50-2.00			
	CFISS-021-SO-0.5-2			
	6/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.006	--	0.006	0.006
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.005	--	0.005	0.005
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.042	--	0.042	0.042
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.003	41.1%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.010	32.7%	0.007	0.013
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.006	--	0.006	0.006
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.13	76.1%	0.031	0.23
Dibenzofuran	0.013	70.0%	0.004	0.022
Diethyl Phthalate	0.004	--	0.004	0.004
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.004	--	0.004	0.004
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.011	32.5%	0.007	0.015
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.019	--	0.019	0.019
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-022			
	0.00-0.50			
	CFISS-022-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	27,500	4.68%	26,212	28,788
Antimony	1.00	28.1%	0.72	1.28
Arsenic	12.3	13.8%	10.6	14.0
Barium	143	4.03%	137	149
Beryllium	0.99	6.32%	0.93	1.05
Cadmium	1.20	15.0%	1.02	1.38
Chromium, Total	50.4	10.6%	45.1	55.7
Chromium, Hexavalent	1.35	10.6%	1.21	1.49
Chromium, Trivalent	49.1	10.6%	43.9	54.2
Cobalt	9.30	3.51%	8.97	9.63
Copper	47.6	12.3%	41.8	53.4
Iron	30,400	3.40%	29,367	31,433
Lead	64.9	48.5%	33.4	96.4
Manganese	564	5.63%	532	596
Mercury	0.026	54.9%	0.012	0.040
Nickel	142	14.5%	121	163
Selenium	13.3	20.0%	10.6	16.0
Silver	0.11	9.03%	0.10	0.12
Thallium	0.40	14.4%	0.34	0.46
Vanadium	54.5	9.21%	49.5	59.5
Zinc	88.2	12.7%	77.0	99.4
Other Inorganic Parameters (mg/kg)				
Cyanide	0.66	40.2%	0.39	0.93
Fluoride	732	20.5%	582	882
Essential Nutrients (mg/kg)				
Calcium	12,600	10.7%	11,256	13,944
Magnesium	10,700	2.82%	10,398	11,002
Potassium	2,150	6.24%	2,016	2,284
Sodium	1,670	30.7%	1,157	2,183
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-022			
	0.00-0.50			
	CFISS-022-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.060	140%	-2.37E-02	0.14
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.060	140%	-2.37E-02	0.14
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.16	47.1%	0.085	0.24
Acenaphthene	0.73	42.0%	0.42	1.04
Acenaphthylene	0.026	36.1%	0.017	0.035
Anthracene	1.60	37.7%	1.00	2.20
Fluoranthene	13.0	37.3%	8.15	17.8
Fluorene	0.52	34.6%	0.34	0.70
Naphthalene	0.36	44.9%	0.20	0.52
Phenanthrene	6.60	31.0%	4.55	8.65
Total LMW PAHs - 1/2MDL	23.0	35.8%	14.8	31.2
Total LMW PAHs - MDL	23.0	35.8%	14.8	31.2
Total LMW PAHs - Zero	23.0	35.9%	14.7	31.2
Benzo(A)Pyrene	7.70	36.1%	4.92	10.5
Benzo(A)Anthracene	11.0	32.0%	7.48	14.5
Benzo(B)Fluoranthene	45.0	29.8%	31.6	58.4
Benzo(G,H,I)Perylene	17.0	30.8%	11.8	22.2
Benzo(K)Fluoranthene	11.0	31.3%	7.56	14.4
Chrysene	29.0	35.9%	18.6	39.4
Dibenz(A,H)Anthracene	6.80	39.8%	4.09	9.51
Indeno(1,2,3-C,D)Pyrene	17.0	31.1%	11.7	22.3
Pyrene	16.0	39.3%	9.71	22.3
Total HMW PAHs - 1/2MDL	161	26.8%	117	204
Total HMW PAHs - MDL	161	26.8%	117	204
Total HMW PAHs - Zero	161	26.8%	117	204
Total PAHs - 1/2MDL	138	29.6%	97.5	179
Total PAHs - MDL	138	29.5%	97.5	179
Total PAHs - Zero	138	29.6%	97.4	179
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-022			
	0.00-0.50			
	CFISS-022-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.011	--	0.011	0.011
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.041	49.7%	0.021	0.061
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	1.40	30.5%	0.97	1.83
Dibenzofuran	0.30	33.5%	0.20	0.40
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.035	--	0.035	0.035
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.024	--	0.024	0.024
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.018	--	0.018	0.018

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-022			
	0.50-2.00			
	CFISS-022-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,700	4.58%	16,890	18,510
Antimony	0.16	70.4%	0.047	0.27
Arsenic	5.80	7.46%	5.37	6.23
Barium	168	9.24%	152	184
Beryllium	0.89	4.90%	0.85	0.93
Cadmium	0.13	6.03%	0.12	0.14
Chromium, Total	20.0	7.75%	18.5	21.5
Chromium, Hexavalent	0.54	7.75%	0.49	0.58
Chromium, Trivalent	19.5	7.75%	18.0	21.0
Cobalt	6.50	1.99%	6.37	6.63
Copper	17.8	4.63%	17.0	18.6
Iron	17,800	2.40%	17,373	18,227
Lead	15.0	3.33%	14.5	15.5
Manganese	563	7.15%	523	603
Mercury	0.021	27.4%	0.015	0.027
Nickel	18.6	6.58%	17.4	19.8
Selenium	1.90	19.1%	1.54	2.26
Silver	0.047	9.83%	0.042	0.052
Thallium	0.11	6.56%	0.10	0.12
Vanadium	15.7	3.31%	15.2	16.2
Zinc	55.1	5.42%	52.1	58.1
Other Inorganic Parameters (mg/kg)				
Cyanide	0.63	32.7%	0.42	0.84
Fluoride	282	28.8%	201	363
Essential Nutrients (mg/kg)				
Calcium	11,100	15.1%	9,419	12,781
Magnesium	10,700	2.18%	10,467	10,933
Potassium	1,280	6.91%	1,192	1,368
Sodium	461	21.1%	364	558
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-022			
	0.50-2.00			
	CFISS-022-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.014	47.7%	0.007	0.021
Acenaphthene	0.059	80.9%	0.011	0.11
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.096	82.4%	0.017	0.18
Fluoranthene	0.59	71.4%	0.17	1.01
Fluorene	0.056	74.2%	0.014	0.098
Naphthalene	0.024	28.9%	0.017	0.031
Phenanthrene	0.46	78.1%	0.10	0.82
Total LMW PAHs - 1/2MDL	1.30	74.3%	0.34	2.27
Total LMW PAHs - MDL	1.31	74.3%	0.34	2.28
Total LMW PAHs - Zero	1.30	74.3%	0.33	2.26
Benzo(A)Pyrene	0.33	67.2%	0.11	0.55
Benzo(A)Anthracene	0.30	68.8%	0.094	0.51
Benzo(B)Fluoranthene	0.65	60.1%	0.26	1.04
Benzo(G,H,I)Perylene	0.31	60.8%	0.12	0.50
Benzo(K)Fluoranthene	0.20	64.5%	0.071	0.33
Chrysene	0.43	62.9%	0.16	0.70
Dibenz(A,H)Anthracene	0.087	63.9%	0.031	0.14
Indeno(1,2,3-C,D)Pyrene	0.33	62.0%	0.13	0.53
Pyrene	0.74	72.7%	0.20	1.28
Total HMW PAHs - 1/2MDL	3.38	64.7%	1.19	5.56
Total HMW PAHs - MDL	3.38	64.7%	1.19	5.56
Total HMW PAHs - Zero	3.38	64.7%	1.19	5.56
Total PAHs - 1/2MDL	4.02	68.3%	1.27	6.76
Total PAHs - MDL	4.02	68.3%	1.27	6.77
Total PAHs - Zero	4.01	68.3%	1.27	6.75
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-022			
	0.50-2.00			
	CFISS-022-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.007	41.1%	0.004	0.010
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.014	32.7%	0.009	0.019
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.035	--	0.035	0.035
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.050	76.1%	0.012	0.088
Dibenzofuran	0.028	70.0%	0.008	0.048
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-023			
	0.00-0.50			
	CFISS-023-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,500	4.68%	16,681	18,319
Antimony	0.15	28.1%	0.11	0.19
Arsenic	5.30	13.8%	4.57	6.03
Barium	110	4.03%	106	114
Beryllium	0.65	6.32%	0.61	0.69
Cadmium	0.18	15.0%	0.15	0.21
Chromium, Total	15.8	10.6%	14.1	17.5
Chromium, Hexavalent	0.42	10.6%	0.38	0.47
Chromium, Trivalent	15.4	10.6%	13.8	17.0
Cobalt	6.50	3.51%	6.27	6.73
Copper	17.4	12.3%	15.3	19.5
Iron	17,200	3.40%	16,615	17,785
Lead	14.6	48.5%	7.52	21.7
Manganese	465	5.63%	439	491
Mercury	0.020	54.9%	0.009	0.031
Nickel	26.3	14.5%	22.5	30.1
Selenium	1.80	20.0%	1.44	2.16
Silver	0.048	9.03%	0.044	0.052
Thallium	0.098	14.4%	0.084	0.11
Vanadium	15.3	9.21%	13.9	16.7
Zinc	89.2	12.7%	77.9	101
Other Inorganic Parameters (mg/kg)				
Cyanide	0.19	40.2%	0.11	0.27
Fluoride	39.3	20.5%	31.2	47.4
Essential Nutrients (mg/kg)				
Calcium	13,300	10.7%	11,881	14,719
Magnesium	11,000	2.82%	10,690	11,310
Potassium	1,150	6.24%	1,078	1,222
Sodium	79.9	30.7%	55.3	104
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-023			
	0.00-0.50			
	CFISS-023-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.1%	0.002	0.005
Acenaphthene	0.014	42.0%	0.008	0.020
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.016	37.7%	0.010	0.022
Fluoranthene	0.41	37.3%	0.26	0.56
Fluorene	0.010	34.6%	0.007	0.013
Naphthalene	0.004	44.9%	0.002	0.006
Phenanthrene	0.18	31.0%	0.12	0.24
Total LMW PAHs - 1/2MDL	0.64	35.8%	0.41	0.87
Total LMW PAHs - MDL	0.67	35.8%	0.43	0.91
Total LMW PAHs - Zero	0.61	35.9%	0.39	0.83
Benzo(A)Pyrene	0.36	36.1%	0.23	0.49
Benzo(A)Anthracene	0.25	32.0%	0.17	0.33
Benzo(B)Fluoranthene	0.79	29.8%	0.55	1.03
Benzo(G,H,I)Perylene	0.44	30.8%	0.30	0.58
Benzo(K)Fluoranthene	0.25	31.3%	0.17	0.33
Chrysene	0.46	35.9%	0.29	0.63
Dibenz(A,H)Anthracene	0.11	39.8%	0.066	0.15
Indeno(1,2,3-C,D)Pyrene	0.44	31.1%	0.30	0.58
Pyrene	0.58	39.3%	0.35	0.81
Total HMW PAHs - 1/2MDL	3.68	26.8%	2.69	4.67
Total HMW PAHs - MDL	3.68	26.8%	2.69	4.67
Total HMW PAHs - Zero	3.68	26.8%	2.69	4.67
Total PAHs - 1/2MDL	3.53	29.6%	2.49	4.57
Total PAHs - MDL	3.55	29.5%	2.50	4.60
Total PAHs - Zero	3.50	29.6%	2.47	4.54
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-023			
	0.00-0.50			
	CFISS-023-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.007	44.4%	0.004	0.011
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.033	--	0.033	0.033
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.032	30.5%	0.022	0.042
Dibenzofuran	0.005	33.5%	0.003	0.007
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.015	--	0.015	0.015
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-023			
	0.50-2.00			
	CFISS-023-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,100	4.58%	14,409	15,791
Antimony	0.13	70.4%	0.038	0.22
Arsenic	5.60	7.46%	5.18	6.02
Barium	138	9.24%	125	151
Beryllium	0.57	4.90%	0.54	0.60
Cadmium	0.092	6.03%	0.086	0.098
Chromium, Total	15.5	7.75%	14.3	16.7
Chromium, Hexavalent	0.41	7.75%	0.38	0.45
Chromium, Trivalent	15.1	7.75%	13.9	16.3
Cobalt	6.50	1.99%	6.37	6.63
Copper	16.6	4.63%	15.8	17.4
Iron	17,200	2.40%	16,787	17,613
Lead	12.8	3.33%	12.4	13.2
Manganese	501	7.15%	465	537
Mercury	0.021	27.4%	0.015	0.027
Nickel	14.3	6.58%	13.4	15.2
Selenium	1.90	19.1%	1.54	2.26
Silver	0.043	9.83%	0.039	0.047
Thallium	0.098	6.56%	0.092	0.10
Vanadium	13.0	3.31%	12.6	13.4
Zinc	50.5	5.42%	47.8	53.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.11	32.7%	0.074	0.15
Fluoride	44.6	28.8%	31.8	57.4
Essential Nutrients (mg/kg)				
Calcium	17,600	15.1%	14,935	20,265
Magnesium	11,100	2.18%	10,858	11,342
Potassium	1,210	6.91%	1,126	1,294
Sodium	80.3	21.1%	63.4	97.2
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-023			
	0.50-2.00			
	CFISS-023-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.007	47.7%	0.004	0.011
Acenaphthene	0.019	80.9%	0.004	0.034
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.033	82.4%	0.006	0.060
Fluoranthene	0.19	71.4%	0.054	0.33
Fluorene	0.020	74.2%	0.005	0.035
Naphthalene	0.014	28.9%	0.010	0.018
Phenanthrene	0.18	78.1%	0.039	0.32
Total LMW PAHs - 1/2MDL	0.47	74.3%	0.12	0.81
Total LMW PAHs - MDL	0.47	74.3%	0.12	0.82
Total LMW PAHs - Zero	0.46	74.3%	0.12	0.81
Benzo(A)Pyrene	0.12	67.2%	0.039	0.20
Benzo(A)Anthracene	0.12	68.8%	0.037	0.20
Benzo(B)Fluoranthene	0.16	60.1%	0.064	0.26
Benzo(G,H,I)Perylene	0.15	60.8%	0.059	0.24
Benzo(K)Fluoranthene	0.077	64.5%	0.027	0.13
Chrysene	0.14	62.9%	0.052	0.23
Dibenz(A,H)Anthracene	0.008	63.9%	0.003	0.013
Indeno(1,2,3-C,D)Pyrene	0.12	62.0%	0.046	0.19
Pyrene	0.26	72.7%	0.071	0.45
Total HMW PAHs - 1/2MDL	1.16	64.7%	0.41	1.90
Total HMW PAHs - MDL	1.16	64.7%	0.41	1.92
Total HMW PAHs - Zero	1.15	64.7%	0.40	1.89
Total PAHs - 1/2MDL	1.46	68.3%	0.46	2.45
Total PAHs - MDL	1.47	68.3%	0.46	2.47
Total PAHs - Zero	1.44	68.3%	0.46	2.43
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-023			
	0.50-2.00			
	CFISS-023-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.005	--	0.005	0.005
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.003	41.1%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.014	--	0.014	0.014
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.018	76.1%	0.004	0.032
Dibenzofuran	0.011	70.0%	0.003	0.019
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.011	--	0.011	0.011
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.004	--	0.004	0.004
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.003	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.019	--	0.019	0.019
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-024			
	0.00-0.50			
	CFISS-024-SO-0-0.5			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	22,900	4.68%	21,828	23,972
Antimony	0.22	28.1%	0.16	0.28
Arsenic	6.00	13.8%	5.17	6.83
Barium	97.2	4.03%	93.3	101
Beryllium	0.81	6.32%	0.76	0.86
Cadmium	0.28	15.0%	0.24	0.32
Chromium, Total	18.5	10.6%	16.5	20.5
Chromium, Hexavalent	0.50	10.6%	0.44	0.55
Chromium, Trivalent	18.0	10.6%	16.1	19.9
Cobalt	6.30	3.51%	6.08	6.52
Copper	19.6	12.3%	17.2	22.0
Iron	16,700	3.40%	16,132	17,268
Lead	18.1	48.5%	9.32	26.9
Manganese	390	5.63%	368	412
Mercury	0.039	54.9%	0.018	0.060
Nickel	51.4	14.5%	44.0	58.8
Selenium	1.60	20.0%	1.28	1.92
Silver	0.047	9.03%	0.043	0.051
Thallium	0.10	14.4%	0.086	0.11
Vanadium	21.7	9.21%	19.7	23.7
Zinc	77.8	12.7%	67.9	87.7
Other Inorganic Parameters (mg/kg)				
Cyanide	0.31	40.2%	0.19	0.43
Fluoride	592	20.5%	470	714
Essential Nutrients (mg/kg)				
Calcium	23,600	10.7%	21,083	26,117
Magnesium	11,800	2.82%	11,467	12,133
Potassium	1,790	6.24%	1,678	1,902
Sodium	1,520	30.7%	1,053	1,987
Pesticides (mg/kg)				
Aldrin	3.90E-04	--	3.90E-04	3.90E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.50E-04	--	4.50E-04	4.50E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.50E-04	--	3.50E-04	3.50E-04
Dieldrin	4.20E-04	--	4.20E-04	4.20E-04
Endosulfan Sulfate	3.75E-04	--	3.75E-04	3.75E-04
Endrin	4.10E-04	--	4.10E-04	4.10E-04
Endrin Aldehyde	4.00E-04	--	4.00E-04	4.00E-04
Endrin Ketone	4.50E-04	--	4.50E-04	4.50E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.15E-04	--	4.15E-04	4.15E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.25E-04	--	4.25E-04	4.25E-04
P,P'-DDE	4.70E-04	--	4.70E-04	4.70E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-024			
	0.00-0.50			
	CFISS-024-SO-0-0.5			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	140%	-1.76E-03	0.011
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	140%	-1.76E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.052	47.1%	0.028	0.076
Acenaphthene	0.35	42.0%	0.20	0.50
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.57	37.7%	0.36	0.78
Fluoranthene	5.10	37.3%	3.20	7.00
Fluorene	0.22	34.6%	0.14	0.30
Naphthalene	0.11	44.9%	0.061	0.16
Phenanthrene	2.70	31.0%	1.86	3.54
Total LMW PAHs - 1/2MDL	9.11	35.8%	5.85	12.4
Total LMW PAHs - MDL	9.12	35.8%	5.86	12.4
Total LMW PAHs - Zero	9.10	35.9%	5.84	12.4
Benzo(A)Pyrene	3.50	36.1%	2.23	4.77
Benzo(A)Anthracene	2.90	32.0%	1.97	3.83
Benzo(B)Fluoranthene	4.90	29.8%	3.44	6.36
Benzo(G,H,I)Perylene	3.80	30.8%	2.63	4.97
Benzo(K)Fluoranthene	1.50	31.3%	1.03	1.97
Chrysene	4.00	35.9%	2.56	5.44
Dibenz(A,H)Anthracene	1.00	39.8%	0.60	1.40
Indeno(1,2,3-C,D)Pyrene	4.00	31.1%	2.76	5.24
Pyrene	3.50	39.3%	2.12	4.88
Total HMW PAHs - 1/2MDL	29.1	26.8%	21.3	36.9
Total HMW PAHs - MDL	29.1	26.8%	21.3	36.9
Total HMW PAHs - Zero	29.1	26.8%	21.3	36.9
Total PAHs - 1/2MDL	33.3	29.6%	23.4	43.1
Total PAHs - MDL	33.3	29.5%	23.4	43.1
Total PAHs - Zero	33.3	29.6%	23.4	43.1
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.024	--	0.024	0.024
1,4-Dioxane (P-Dioxane)	0.085	--	0.085	0.085
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.032	--	0.032	0.032
2,4,6-Trichlorophenol	0.009	--	0.009	0.009
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.070	--	0.070	0.070

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-024			
	0.00-0.50			
	CFISS-024-SO-0-0.5			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.017	--	0.017	0.017
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.008	--	0.008	0.008
2-Methylphenol (O-Cresol)	0.014	--	0.014	0.014
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.036	--	0.036	0.036
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.085	--	0.085	0.085
4-Bromophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.012	--	0.012	0.012
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.010	--	0.010	0.010
Biphenyl (Diphenyl)	0.028	49.7%	0.014	0.041
Bis(2-Chloroethoxy) Methane	0.010	--	0.010	0.010
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.43	30.5%	0.30	0.56
Dibenzofuran	0.14	33.5%	0.093	0.19
Diethyl Phthalate	0.009	--	0.009	0.009
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.013	--	0.013	0.013
Hexachlorobutadiene	0.009	--	0.009	0.009
Hexachlorocyclopentadiene	0.020	--	0.020	0.020
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.076	--	0.076	0.076
Nitrobenzene	0.010	--	0.010	0.010
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.039	--	0.039	0.039
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-024			
	0.50-2.00			
	CFISS-024-SO-0.5-2			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	13,200	4.58%	12,596	13,804
Antimony	0.14	70.4%	0.041	0.24
Arsenic	5.00	7.46%	4.63	5.37
Barium	123	9.24%	112	134
Beryllium	0.56	4.90%	0.53	0.59
Cadmium	0.10	6.03%	0.094	0.11
Chromium, Total	15.9	7.75%	14.7	17.1
Chromium, Hexavalent	0.43	7.75%	0.39	0.46
Chromium, Trivalent	15.5	7.75%	14.3	16.7
Cobalt	6.10	1.99%	5.98	6.22
Copper	17.7	4.63%	16.9	18.5
Iron	15,400	2.40%	15,030	15,770
Lead	12.4	3.33%	12.0	12.8
Manganese	437	7.15%	406	468
Mercury	0.021	27.4%	0.015	0.027
Nickel	19.0	6.58%	17.8	20.2
Selenium	1.50	19.1%	1.21	1.79
Silver	0.049	9.83%	0.044	0.054
Thallium	0.082	6.56%	0.077	0.087
Vanadium	13.4	3.31%	13.0	13.8
Zinc	52.4	5.42%	49.6	55.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.14	32.7%	0.094	0.19
Fluoride	204	28.8%	145	263
Essential Nutrients (mg/kg)				
Calcium	25,400	15.1%	21,554	29,246
Magnesium	11,700	2.18%	11,445	11,955
Potassium	1,270	6.91%	1,182	1,358
Sodium	177	21.1%	140	214
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-024			
	0.50-2.00			
	CFISS-024-SO-0.5-2			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.037	47.7%	0.019	0.055
Acenaphthene	0.31	80.9%	0.059	0.56
Acenaphthylene	0.009	62.8%	0.003	0.014
Anthracene	0.53	82.4%	0.093	0.97
Fluoranthene	4.40	71.4%	1.26	7.54
Fluorene	0.20	74.2%	0.052	0.35
Naphthalene	0.060	28.9%	0.043	0.077
Phenanthrene	2.70	78.1%	0.59	4.81
Total LMW PAHs - 1/2MDL	8.25	74.3%	2.12	14.4
Total LMW PAHs - MDL	8.25	74.3%	2.12	14.4
Total LMW PAHs - Zero	8.24	74.3%	2.12	14.4
Benzo(A)Pyrene	3.10	67.2%	1.02	5.18
Benzo(A)Anthracene	2.40	68.8%	0.75	4.05
Benzo(B)Fluoranthene	3.40	60.1%	1.36	5.44
Benzo(G,H,I)Perylene	2.90	60.8%	1.14	4.66
Benzo(K)Fluoranthene	1.20	64.5%	0.43	1.97
Chrysene	3.10	62.9%	1.15	5.05
Dibenz(A,H)Anthracene	0.69	63.9%	0.25	1.13
Indeno(1,2,3-C,D)Pyrene	3.00	62.0%	1.14	4.86
Pyrene	3.80	72.7%	1.04	6.56
Total HMW PAHs - 1/2MDL	23.6	64.7%	8.32	38.9
Total HMW PAHs - MDL	23.6	64.7%	8.32	38.9
Total HMW PAHs - Zero	23.6	64.7%	8.32	38.9
Total PAHs - 1/2MDL	28.4	68.3%	8.99	47.8
Total PAHs - MDL	28.4	68.3%	9.00	47.8
Total PAHs - Zero	28.4	68.3%	8.99	47.8
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.032	--	0.032	0.032
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-024			
	0.50-2.00			
	CFISS-024-SO-0.5-2			
	6/29/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.015	--	0.015	0.015
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.008	41.1%	0.004	0.011
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.026	--	0.026	0.026
Benzyl Butyl Phthalate	0.011	32.7%	0.007	0.014
Biphenyl (Diphenyl)	0.029	98.2%	5.13E-04	0.056
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.45	76.1%	0.11	0.79
Dibenzofuran	0.089	70.0%	0.027	0.15
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	32.5%	0.005	0.009
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.041	--	0.041	0.041
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-025			
	0.00-0.50			
	CFISS-025-SO-0-0.5			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	24,800	4.68%	23,639	25,961
Antimony	0.40	28.1%	0.29	0.51
Arsenic	6.00	13.8%	5.17	6.83
Barium	98.7	4.03%	94.7	103
Beryllium	0.67	6.32%	0.63	0.71
Cadmium	0.38	15.0%	0.32	0.44
Chromium, Total	18.3	10.6%	16.4	20.2
Chromium, Hexavalent	0.49	10.6%	0.44	0.54
Chromium, Trivalent	17.8	10.6%	15.9	19.7
Cobalt	6.30	3.51%	6.08	6.52
Copper	33.3	12.3%	29.2	37.4
Iron	17,500	3.40%	16,905	18,095
Lead	19.7	48.5%	10.1	29.3
Manganese	399	5.63%	377	421
Mercury	0.008	54.9%	0.003	0.012
Nickel	46.6	14.5%	39.9	53.3
Selenium	1.90	20.0%	1.52	2.28
Silver	0.065	9.03%	0.059	0.071
Thallium	0.11	14.4%	0.094	0.13
Vanadium	20.9	9.21%	19.0	22.8
Zinc	70.3	12.7%	61.4	79.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.69	40.2%	0.41	0.97
Fluoride	69.8	20.5%	55.5	84.1
Essential Nutrients (mg/kg)				
Calcium	27,900	10.7%	24,924	30,876
Magnesium	11,700	2.82%	11,370	12,030
Potassium	1,680	6.24%	1,575	1,785
Sodium	312	30.7%	216	408
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-025			
	0.00-0.50			
	CFISS-025-SO-0-0.5			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.033	47.1%	0.017	0.049
Acenaphthene	0.21	42.0%	0.12	0.30
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.40	37.7%	0.25	0.55
Fluoranthene	4.00	37.3%	2.51	5.49
Fluorene	0.13	34.6%	0.085	0.18
Naphthalene	0.054	44.9%	0.030	0.078
Phenanthrene	2.10	31.0%	1.45	2.75
Total LMW PAHs - 1/2MDL	6.94	35.8%	4.45	9.42
Total LMW PAHs - MDL	6.94	35.8%	4.46	9.43
Total LMW PAHs - Zero	6.93	35.9%	4.44	9.41
Benzo(A)Pyrene	3.10	36.1%	1.98	4.22
Benzo(A)Anthracene	2.40	32.0%	1.63	3.17
Benzo(B)Fluoranthene	4.60	29.8%	3.23	5.97
Benzo(G,H,I)Perylene	4.90	30.8%	3.39	6.41
Benzo(K)Fluoranthene	1.80	31.3%	1.24	2.36
Chrysene	3.60	35.9%	2.31	4.89
Dibenz(A,H)Anthracene	1.20	39.8%	0.72	1.68
Indeno(1,2,3-C,D)Pyrene	4.50	31.1%	3.10	5.90
Pyrene	3.80	39.3%	2.31	5.29
Total HMW PAHs - 1/2MDL	29.9	26.8%	21.9	37.9
Total HMW PAHs - MDL	29.9	26.8%	21.9	37.9
Total HMW PAHs - Zero	29.9	26.8%	21.9	37.9
Total PAHs - 1/2MDL	32.2	29.6%	22.7	41.7
Total PAHs - MDL	32.2	29.5%	22.7	41.7
Total PAHs - Zero	32.2	29.6%	22.7	41.7
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-025			
	0.00-0.50			
	CFISS-025-SO-0-0.5			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.015	--	0.015	0.015
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.020	44.4%	0.011	0.029
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.051	--	0.051	0.051
Benzyl Butyl Phthalate	0.046	--	0.046	0.046
Biphenyl (Diphenyl)	0.029	49.7%	0.014	0.043
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.047	--	0.047	0.047
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.35	30.5%	0.24	0.46
Dibenzofuran	0.066	33.5%	0.044	0.088
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-025			
	0.50-2.00			
	CFISS-025-SO-0.5-2			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	13,900	4.58%	13,264	14,536
Antimony	0.14	70.4%	0.041	0.24
Arsenic	4.50	7.46%	4.16	4.84
Barium	94.7	9.24%	85.9	103
Beryllium	0.54	4.90%	0.51	0.57
Cadmium	0.099	6.03%	0.093	0.10
Chromium, Total	15.8	7.75%	14.6	17.0
Chromium, Hexavalent	0.42	7.75%	0.39	0.46
Chromium, Trivalent	15.4	7.75%	14.2	16.6
Cobalt	5.70	1.99%	5.59	5.81
Copper	15.6	4.63%	14.9	16.3
Iron	15,600	2.40%	15,225	15,975
Lead	11.1	3.33%	10.7	11.5
Manganese	403	7.15%	374	432
Mercury	0.016	27.4%	0.012	0.020
Nickel	18.6	6.58%	17.4	19.8
Selenium	1.50	19.1%	1.21	1.79
Silver	0.034	9.83%	0.031	0.037
Thallium	0.077	6.56%	0.072	0.082
Vanadium	12.6	3.31%	12.2	13.0
Zinc	47.7	5.42%	45.1	50.3
Other Inorganic Parameters (mg/kg)				
Cyanide	0.16	32.7%	0.11	0.21
Fluoride	157	28.8%	112	202
Essential Nutrients (mg/kg)				
Calcium	26,900	15.1%	22,827	30,973
Magnesium	11,800	2.18%	11,543	12,057
Potassium	1,210	6.91%	1,126	1,294
Sodium	93.4	21.1%	73.7	113
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-025			
	0.50-2.00			
	CFISS-025-SO-0.5-2			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.017	47.7%	0.009	0.025
Acenaphthene	0.10	80.9%	0.019	0.18
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.19	82.4%	0.033	0.35
Fluoranthene	1.80	71.4%	0.51	3.09
Fluorene	0.068	74.2%	0.018	0.12
Naphthalene	0.027	28.9%	0.019	0.035
Phenanthrene	1.00	78.1%	0.22	1.78
Total LMW PAHs - 1/2MDL	3.21	74.3%	0.83	5.59
Total LMW PAHs - MDL	3.21	74.3%	0.83	5.59
Total LMW PAHs - Zero	3.20	74.3%	0.82	5.58
Benzo(A)Pyrene	1.10	67.2%	0.36	1.84
Benzo(A)Anthracene	0.87	68.8%	0.27	1.47
Benzo(B)Fluoranthene	1.40	60.1%	0.56	2.24
Benzo(G,H,I)Perylene	1.40	60.8%	0.55	2.25
Benzo(K)Fluoranthene	0.50	64.5%	0.18	0.82
Chrysene	1.20	62.9%	0.44	1.96
Dibenz(A,H)Anthracene	0.32	63.9%	0.12	0.52
Indeno(1,2,3-C,D)Pyrene	1.40	62.0%	0.53	2.27
Pyrene	1.40	72.7%	0.38	2.42
Total HMW PAHs - 1/2MDL	9.59	64.7%	3.38	15.8
Total HMW PAHs - MDL	9.59	64.7%	3.38	15.8
Total HMW PAHs - Zero	9.59	64.7%	3.38	15.8
Total PAHs - 1/2MDL	11.4	68.3%	3.60	19.2
Total PAHs - MDL	11.4	68.3%	3.61	19.2
Total PAHs - Zero	11.4	68.3%	3.60	19.1
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-025			
	0.50-2.00			
	CFISS-025-SO-0.5-2			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.012	41.1%	0.007	0.017
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.15	76.1%	0.036	0.26
Dibenzofuran	0.035	70.0%	0.010	0.060
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-026			
	0.00-0.50			
	CFISS-026-SO-0-0.5			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	37,100	4.68%	35,363	38,837
Antimony	0.27	28.1%	0.19	0.35
Arsenic	7.20	13.8%	6.20	8.20
Barium	251	4.03%	241	261
Beryllium	1.30	6.32%	1.22	1.38
Cadmium	0.55	15.0%	0.47	0.63
Chromium, Total	27.6	10.6%	24.7	30.5
Chromium, Hexavalent	0.74	10.6%	0.66	0.82
Chromium, Trivalent	26.9	10.6%	24.0	29.7
Cobalt	7.20	3.51%	6.95	7.45
Copper	45.2	12.3%	39.7	50.7
Iron	27,100	3.40%	26,179	28,021
Lead	37.6	48.5%	19.4	55.8
Manganese	583	5.63%	550	616
Mercury	0.008	54.9%	0.004	0.012
Nickel	54.1	14.5%	46.3	61.9
Selenium	3.10	20.0%	2.48	3.72
Silver	0.11	9.03%	0.10	0.12
Thallium	0.17	14.4%	0.15	0.19
Vanadium	27.7	9.21%	25.1	30.3
Zinc	90.0	12.7%	78.6	101
Other Inorganic Parameters (mg/kg)				
Cyanide	0.38	40.2%	0.23	0.53
Fluoride	617	20.5%	490	744
Essential Nutrients (mg/kg)				
Calcium	9,150	10.7%	8,174	10,126
Magnesium	9,870	2.82%	9,592	10,148
Potassium	2,290	6.24%	2,147	2,433
Sodium	2,160	30.7%	1,496	2,824
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-026			
	0.00-0.50			
	CFISS-026-SO-0-0.5			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.80E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.80E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.17	47.1%	0.090	0.25
Acenaphthene	0.41	42.0%	0.24	0.58
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.58	37.7%	0.36	0.80
Fluoranthene	3.00	37.3%	1.88	4.12
Fluorene	0.39	34.6%	0.25	0.53
Naphthalene	0.64	44.9%	0.35	0.93
Phenanthrene	2.60	31.0%	1.79	3.41
Total LMW PAHs - 1/2MDL	7.80	35.8%	5.00	10.6
Total LMW PAHs - MDL	7.81	35.8%	5.01	10.6
Total LMW PAHs - Zero	7.79	35.9%	4.99	10.6
Benzo(A)Pyrene	1.80	36.1%	1.15	2.45
Benzo(A)Anthracene	1.70	32.0%	1.16	2.24
Benzo(B)Fluoranthene	4.00	29.8%	2.81	5.19
Benzo(G,H,I)Perylene	2.70	30.8%	1.87	3.53
Benzo(K)Fluoranthene	1.20	31.3%	0.82	1.58
Chrysene	2.90	35.9%	1.86	3.94
Dibenz(A,H)Anthracene	0.86	39.8%	0.52	1.20
Indeno(1,2,3-C,D)Pyrene	3.00	31.1%	2.07	3.93
Pyrene	2.70	39.3%	1.64	3.76
Total HMW PAHs - 1/2MDL	20.9	26.8%	15.3	26.4
Total HMW PAHs - MDL	20.9	26.8%	15.3	26.4
Total HMW PAHs - Zero	20.9	26.8%	15.3	26.4
Total PAHs - 1/2MDL	24.5	29.6%	17.3	31.7
Total PAHs - MDL	24.5	29.5%	17.3	31.7
Total PAHs - Zero	24.5	29.6%	17.2	31.7
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-026			
	0.00-0.50			
	CFISS-026-SO-0-0.5			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.023	44.4%	0.013	0.033
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.010	--	0.010	0.010
Biphenyl (Diphenyl)	0.058	49.7%	0.029	0.087
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.055	--	0.055	0.055
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.34	30.5%	0.24	0.44
Dibenzofuran	0.26	33.5%	0.17	0.35
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.021	--	0.021	0.021
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-026			
	0.50-2.00			
	CFISS-026-SO-0.5-2			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	22,400	4.58%	21,375	23,425
Antimony	0.16	70.4%	0.047	0.27
Arsenic	5.60	7.46%	5.18	6.02
Barium	158	9.24%	143	173
Beryllium	0.82	4.90%	0.78	0.86
Cadmium	0.17	6.03%	0.16	0.18
Chromium, Total	18.9	7.75%	17.4	20.4
Chromium, Hexavalent	0.51	7.75%	0.47	0.55
Chromium, Trivalent	18.4	7.75%	17.0	19.8
Cobalt	6.10	1.99%	5.98	6.22
Copper	18.0	4.63%	17.2	18.8
Iron	17,200	2.40%	16,787	17,613
Lead	13.0	3.33%	12.6	13.4
Manganese	455	7.15%	422	488
Mercury	0.017	27.4%	0.012	0.022
Nickel	21.2	6.58%	19.8	22.6
Selenium	2.00	19.1%	1.62	2.38
Silver	0.050	9.83%	0.045	0.055
Thallium	0.12	6.56%	0.11	0.13
Vanadium	18.2	3.31%	17.6	18.8
Zinc	56.8	5.42%	53.7	59.9
Other Inorganic Parameters (mg/kg)				
Cyanide	0.26	32.7%	0.18	0.34
Fluoride	632	28.8%	450	814
Essential Nutrients (mg/kg)				
Calcium	18,800	15.1%	15,954	21,646
Magnesium	11,400	2.18%	11,151	11,649
Potassium	2,180	6.91%	2,029	2,331
Sodium	2,020	21.1%	1,594	2,446
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-026			
	0.50-2.00			
	CFISS-026-SO-0.5-2			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.019	47.7%	0.010	0.028
Acenaphthene	0.077	80.9%	0.015	0.14
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.16	82.4%	0.028	0.29
Fluoranthene	1.60	71.4%	0.46	2.74
Fluorene	0.064	74.2%	0.017	0.11
Naphthalene	0.046	28.9%	0.033	0.059
Phenanthrene	0.82	78.1%	0.18	1.46
Total LMW PAHs - 1/2MDL	2.79	74.3%	0.72	4.86
Total LMW PAHs - MDL	2.79	74.3%	0.72	4.87
Total LMW PAHs - Zero	2.79	74.3%	0.72	4.86
Benzo(A)Pyrene	1.30	67.2%	0.43	2.17
Benzo(A)Anthracene	1.00	68.8%	0.31	1.69
Benzo(B)Fluoranthene	1.70	60.1%	0.68	2.72
Benzo(G,H,I)Perylene	1.30	60.8%	0.51	2.09
Benzo(K)Fluoranthene	0.60	64.5%	0.21	0.99
Chrysene	1.30	62.9%	0.48	2.12
Dibenz(A,H)Anthracene	0.38	63.9%	0.14	0.62
Indeno(1,2,3-C,D)Pyrene	1.40	62.0%	0.53	2.27
Pyrene	1.30	72.7%	0.35	2.25
Total HMW PAHs - 1/2MDL	10.3	64.7%	3.63	16.9
Total HMW PAHs - MDL	10.3	64.7%	3.63	16.9
Total HMW PAHs - Zero	10.3	64.7%	3.63	16.9
Total PAHs - 1/2MDL	11.4	68.3%	3.59	19.1
Total PAHs - MDL	11.4	68.3%	3.60	19.1
Total PAHs - Zero	11.3	68.3%	3.59	19.1
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-026			
	0.50-2.00			
	CFISS-026-SO-0.5-2			
	6/30/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.017	41.1%	0.010	0.024
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.006	--	0.006	0.006
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.13	76.1%	0.031	0.23
Dibenzofuran	0.035	70.0%	0.010	0.060
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.10	32.5%	0.068	0.13
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-027			
	0.00-0.50			
	CFISS-027-SO-0-0.5			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	30,900	4.68%	29,453	32,347
Antimony	0.31	28.1%	0.22	0.40
Arsenic	8.20	13.8%	7.07	9.33
Barium	293	4.03%	281	305
Beryllium	1.10	6.32%	1.03	1.17
Cadmium	0.65	15.0%	0.55	0.75
Chromium, Total	38.5	10.6%	34.4	42.6
Chromium, Hexavalent	1.03	10.6%	0.92	1.14
Chromium, Trivalent	37.5	10.6%	33.5	41.4
Cobalt	7.60	3.51%	7.33	7.87
Copper	40.3	12.3%	35.4	45.2
Iron	25,500	3.40%	24,633	26,367
Lead	61.2	48.5%	31.5	90.9
Manganese	485	5.63%	458	512
Mercury	0.018	54.9%	0.008	0.028
Nickel	78.0	14.5%	66.7	89.3
Selenium	5.70	20.0%	4.56	6.84
Silver	0.096	9.03%	0.087	0.10
Thallium	0.22	14.4%	0.19	0.25
Vanadium	33.7	9.21%	30.6	36.8
Zinc	83.3	12.7%	72.7	93.9
Other Inorganic Parameters (mg/kg)				
Cyanide	0.43	40.2%	0.26	0.60
Fluoride	244	20.5%	194	294
Essential Nutrients (mg/kg)				
Calcium	7,060	10.7%	6,307	7,813
Magnesium	10,000	2.82%	9,718	10,282
Potassium	2,370	6.24%	2,222	2,518
Sodium	739	30.7%	512	966
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-027			
	0.00-0.50			
	CFISS-027-SO-0-0.5			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.079	47.1%	0.042	0.12
Acenaphthene	0.13	42.0%	0.075	0.18
Acenaphthylene	0.021	36.1%	0.013	0.029
Anthracene	0.27	37.7%	0.17	0.37
Fluoranthene	3.20	37.3%	2.01	4.39
Fluorene	0.10	34.6%	0.065	0.13
Naphthalene	0.052	44.9%	0.029	0.075
Phenanthrene	1.50	31.0%	1.03	1.97
Total LMW PAHs - 1/2MDL	5.35	35.8%	3.43	7.27
Total LMW PAHs - MDL	5.37	35.8%	3.45	7.30
Total LMW PAHs - Zero	5.33	35.9%	3.42	7.24
Benzo(A)Pyrene	2.00	36.1%	1.28	2.72
Benzo(A)Anthracene	2.70	32.0%	1.83	3.57
Benzo(B)Fluoranthene	12.0	29.8%	8.42	15.6
Benzo(G,H,I)Perylene	6.10	30.8%	4.22	7.98
Benzo(K)Fluoranthene	3.10	31.3%	2.13	4.07
Chrysene	6.10	35.9%	3.91	8.29
Dibenz(A,H)Anthracene	2.40	39.8%	1.44	3.36
Indeno(1,2,3-C,D)Pyrene	6.70	31.1%	4.61	8.79
Pyrene	2.70	39.3%	1.64	3.76
Total HMW PAHs - 1/2MDL	43.8	26.8%	32.1	55.5
Total HMW PAHs - MDL	43.8	26.8%	32.1	55.5
Total HMW PAHs - Zero	43.8	26.8%	32.1	55.5
Total PAHs - 1/2MDL	37.1	29.6%	26.1	48.0
Total PAHs - MDL	37.1	29.5%	26.1	48.1
Total PAHs - Zero	37.1	29.6%	26.1	48.0
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.060	--	0.060	0.060
1,4-Dioxane (P-Dioxane)	0.22	--	0.22	0.22
2,3,4,6-Tetrachlorophenol	0.075	--	0.075	0.075
2,4,5-Trichlorophenol	0.080	--	0.080	0.080
2,4,6-Trichlorophenol	0.023	--	0.023	0.023
2,4-Dichlorophenol	0.019	--	0.019	0.019
2,4-Dimethylphenol	0.18	--	0.18	0.18

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-027			
	0.00-0.50			
	CFISS-027-SO-0-0.5			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.60	--	0.60	0.60
2,4-Dinitrotoluene	0.032	--	0.032	0.032
2,6-Dinitrotoluene	0.043	--	0.043	0.043
2-Chloronaphthalene	0.019	--	0.019	0.019
2-Chlorophenol	0.021	--	0.021	0.021
2-Methylphenol (O-Cresol)	0.036	--	0.036	0.036
2-Nitroaniline	0.027	--	0.027	0.027
2-Nitrophenol	0.027	--	0.027	0.027
3- And 4- Methylphenol (Total)	0.022	--	0.022	0.022
3,3'-Dichlorobenzidine	0.090	--	0.090	0.090
3-Nitroaniline	0.024	--	0.024	0.024
4,6-Dinitro-2-Methylphenol	0.22	--	0.22	0.22
4-Bromophenyl Phenyl Ether	0.026	--	0.026	0.026
4-Chloro-3-Methylphenol	0.035	--	0.035	0.035
4-Chloroaniline	0.021	--	0.021	0.021
4-Chlorophenyl Phenyl Ether	0.024	--	0.024	0.024
4-Nitroaniline	0.031	--	0.031	0.031
4-Nitrophenol	0.39	--	0.39	0.39
Acetophenone	0.018	44.4%	0.010	0.025
Atrazine	0.036	--	0.036	0.036
Benzaldehyde	0.060	--	0.060	0.060
Benzyl Butyl Phthalate	0.025	--	0.025	0.025
Biphenyl (Diphenyl)	0.070	49.7%	0.035	0.10
Bis(2-Chloroethoxy) Methane	0.025	--	0.025	0.025
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.019	--	0.019	0.019
Bis(2-Chloroisopropyl) Ether	0.034	--	0.034	0.034
Bis(2-Ethylhexyl) Phthalate	0.27	--	0.27	0.27
Caprolactam	0.060	--	0.060	0.060
Carbazole	0.25	30.5%	0.17	0.33
Dibenzofuran	0.088	33.5%	0.059	0.12
Diethyl Phthalate	0.023	--	0.023	0.023
Dimethyl Phthalate	0.024	--	0.024	0.024
Di-N-Butyl Phthalate	0.024	--	0.024	0.024
Di-N-Octylphthalate	0.041	--	0.041	0.041
Hexachlorobenzene	0.033	--	0.033	0.033
Hexachlorobutadiene	0.023	--	0.023	0.023
Hexachlorocyclopentadiene	0.050	--	0.050	0.050
Hexachloroethane	0.030	--	0.030	0.030
Isophorone	0.018	--	0.018	0.018
Nitrobenzene	0.026	--	0.026	0.026
N-Nitrosodi-N-Propylamine	0.027	--	0.027	0.027
N-Nitrosodiphenylamine	0.075	--	0.075	0.075
Pentachlorophenol	0.10	--	0.10	0.10
Phenol	0.027	--	0.027	0.027

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-027			
	0.50-2.00			
	CFISS-027-SO-0.5-2			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	24,900	4.58%	23,761	26,039
Antimony	0.21	70.4%	0.062	0.36
Arsenic	5.80	7.46%	5.37	6.23
Barium	165	9.24%	150	180
Beryllium	1.20	4.90%	1.14	1.26
Cadmium	0.19	6.03%	0.18	0.20
Chromium, Total	54.4	7.75%	50.2	58.6
Chromium, Hexavalent	1.46	7.75%	1.34	1.57
Chromium, Trivalent	52.9	7.75%	48.8	57.0
Cobalt	6.30	1.99%	6.17	6.43
Copper	18.7	4.63%	17.8	19.6
Iron	17,200	2.40%	16,787	17,613
Lead	13.9	3.33%	13.4	14.4
Manganese	448	7.15%	416	480
Mercury	0.008	27.4%	0.005	0.010
Nickel	38.5	6.58%	36.0	41.0
Selenium	1.80	19.1%	1.46	2.14
Silver	0.053	9.83%	0.048	0.058
Thallium	0.15	6.56%	0.14	0.16
Vanadium	31.2	3.31%	30.2	32.2
Zinc	53.4	5.42%	50.5	56.3
Other Inorganic Parameters (mg/kg)				
Cyanide	0.43	32.7%	0.29	0.57
Fluoride	946	28.8%	674	1,218
Essential Nutrients (mg/kg)				
Calcium	19,100	15.1%	16,208	21,992
Magnesium	10,700	2.18%	10,467	10,933
Potassium	2,480	6.91%	2,309	2,651
Sodium	2,760	21.1%	2,178	3,342
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-027			
	0.50-2.00			
	CFISS-027-SO-0.5-2			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	4.45E-05	--	4.45E-05	4.45E-05
PCB-1221 (Aroclor 1221)	4.45E-05	--	4.45E-05	4.45E-05
PCB-1232 (Aroclor 1232)	4.45E-05	--	4.45E-05	4.45E-05
PCB-1242 (Aroclor 1242)	4.45E-05	--	4.45E-05	4.45E-05
PCB-1248 (Aroclor 1248)	4.45E-05	--	4.45E-05	4.45E-05
PCB-1254 (Aroclor 1254)	4.60E-05	29.2%	3.26E-05	5.94E-05
PCB-1260 (Aroclor 1260)	4.60E-05	--	4.60E-05	4.60E-05
PCB-1262 (Aroclor 1262)	4.60E-05	--	4.60E-05	4.60E-05
PCB-1268 (Aroclor 1268)	4.60E-05	--	4.60E-05	4.60E-05
Polychlorinated Biphenyl (PCBs)	4.60E-05	29.2%	3.26E-05	5.94E-05
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.054	47.7%	0.028	0.080
Acenaphthene	0.29	80.9%	0.055	0.52
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.58	82.4%	0.10	1.06
Fluoranthene	5.40	71.4%	1.54	9.26
Fluorene	0.22	74.2%	0.057	0.38
Naphthalene	0.079	28.9%	0.056	0.10
Phenanthrene	2.70	78.1%	0.59	4.81
Total LMW PAHs - 1/2MDL	9.33	74.3%	2.40	16.3
Total LMW PAHs - MDL	9.33	74.3%	2.40	16.3
Total LMW PAHs - Zero	9.32	74.3%	2.40	16.2
Benzo(A)Pyrene	3.90	67.2%	1.28	6.52
Benzo(A)Anthracene	3.00	68.8%	0.94	5.06
Benzo(B)Fluoranthene	4.90	60.1%	1.96	7.84
Benzo(G,H,I)Perylene	4.20	60.8%	1.65	6.75
Benzo(K)Fluoranthene	1.70	64.5%	0.60	2.80
Chrysene	4.30	62.9%	1.59	7.01
Dibenz(A,H)Anthracene	1.10	63.9%	0.40	1.80
Indeno(1,2,3-C,D)Pyrene	3.90	62.0%	1.48	6.32
Pyrene	4.60	72.7%	1.26	7.94
Total HMW PAHs - 1/2MDL	31.6	64.7%	11.1	52.1
Total HMW PAHs - MDL	31.6	64.7%	11.1	52.1
Total HMW PAHs - Zero	31.6	64.7%	11.1	52.1
Total PAHs - 1/2MDL	36.0	68.3%	11.4	60.6
Total PAHs - MDL	36.0	68.3%	11.4	60.6
Total PAHs - Zero	36.0	68.3%	11.4	60.5
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-027			
	0.50-2.00			
	CFISS-027-SO-0.5-2			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.005	--	0.005	0.005
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.020	41.1%	0.012	0.028
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.026	--	0.026	0.026
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.074	--	0.074	0.074
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.48	76.1%	0.11	0.85
Dibenzofuran	0.11	70.0%	0.033	0.19
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.004	--	0.004	0.004
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.11	32.5%	0.074	0.15
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.019	--	0.019	0.019
Phenol	0.017	--	0.017	0.017

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-028			
	0.00-0.50			
	CFISS-028-SO-0-0.5			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	26,900	4.68%	25,640	28,160
Antimony	0.15	28.1%	0.11	0.19
Arsenic	5.30	13.8%	4.57	6.03
Barium	262	4.03%	251	273
Beryllium	0.92	6.32%	0.86	0.98
Cadmium	0.22	15.0%	0.19	0.25
Chromium, Total	17.7	10.6%	15.8	19.6
Chromium, Hexavalent	0.47	10.6%	0.42	0.52
Chromium, Trivalent	17.2	10.6%	15.4	19.0
Cobalt	6.50	3.51%	6.27	6.73
Copper	20.6	12.3%	18.1	23.1
Iron	18,400	3.40%	17,775	19,025
Lead	16.6	48.5%	8.55	24.7
Manganese	452	5.63%	427	477
Mercury	0.008	54.9%	0.004	0.012
Nickel	24.7	14.5%	21.1	28.3
Selenium	2.30	20.0%	1.84	2.76
Silver	0.063	9.03%	0.057	0.069
Thallium	0.12	14.4%	0.10	0.14
Vanadium	18.0	9.21%	16.3	19.7
Zinc	64.3	12.7%	56.1	72.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.28	40.2%	0.17	0.39
Fluoride	183	20.5%	145	221
Essential Nutrients (mg/kg)				
Calcium	7,530	10.7%	6,727	8,333
Magnesium	10,100	2.82%	9,815	10,385
Potassium	1,770	6.24%	1,660	1,880
Sodium	357	30.7%	247	467
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-028			
	0.00-0.50			
	CFISS-028-SO-0-0.5			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.011	47.1%	0.006	0.016
Acenaphthene	0.035	42.0%	0.020	0.050
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.079	37.7%	0.049	0.11
Fluoranthene	0.88	37.3%	0.55	1.21
Fluorene	0.028	34.6%	0.018	0.038
Naphthalene	0.019	44.9%	0.010	0.028
Phenanthrene	0.41	31.0%	0.28	0.54
Total LMW PAHs - 1/2MDL	1.47	35.8%	0.94	1.99
Total LMW PAHs - MDL	1.47	35.8%	0.94	2.00
Total LMW PAHs - Zero	1.46	35.9%	0.94	1.99
Benzo(A)Pyrene	0.61	36.1%	0.39	0.83
Benzo(A)Anthracene	0.47	32.0%	0.32	0.62
Benzo(B)Fluoranthene	0.96	29.8%	0.67	1.25
Benzo(G,H,I)Perylene	0.72	30.8%	0.50	0.94
Benzo(K)Fluoranthene	0.35	31.3%	0.24	0.46
Chrysene	0.74	35.9%	0.47	1.01
Dibenz(A,H)Anthracene	0.19	39.8%	0.11	0.27
Indeno(1,2,3-C,D)Pyrene	0.82	31.1%	0.56	1.08
Pyrene	0.65	39.3%	0.39	0.91
Total HMW PAHs - 1/2MDL	5.51	26.8%	4.03	6.99
Total HMW PAHs - MDL	5.51	26.8%	4.03	6.99
Total HMW PAHs - Zero	5.51	26.8%	4.03	6.99
Total PAHs - 1/2MDL	6.01	29.6%	4.23	7.78
Total PAHs - MDL	6.01	29.5%	4.23	7.78
Total PAHs - Zero	6.00	29.6%	4.23	7.77
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-028			
	0.00-0.50			
	CFISS-028-SO-0-0.5			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.030	44.4%	0.017	0.043
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.038	--	0.038	0.038
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.079	30.5%	0.055	0.10
Dibenzofuran	0.017	33.5%	0.011	0.023
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.012	--	0.012	0.012
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.099	--	0.099	0.099
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.015	--	0.015	0.015

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-028			
	0.50-2.00			
	CFISS-028-SO-0.5-2			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	25,600	4.58%	24,429	26,771
Antimony	0.17	70.4%	0.050	0.29
Arsenic	5.90	7.46%	5.46	6.34
Barium	180	9.24%	163	197
Beryllium	0.90	4.90%	0.86	0.94
Cadmium	0.13	6.03%	0.12	0.14
Chromium, Total	19.3	7.75%	17.8	20.8
Chromium, Hexavalent	0.52	7.75%	0.48	0.56
Chromium, Trivalent	18.8	7.75%	17.3	20.2
Cobalt	6.10	1.99%	5.98	6.22
Copper	16.1	4.63%	15.4	16.8
Iron	16,300	2.40%	15,909	16,691
Lead	13.9	3.33%	13.4	14.4
Manganese	454	7.15%	422	486
Mercury	0.008	27.4%	0.006	0.010
Nickel	18.6	6.58%	17.4	19.8
Selenium	1.90	19.1%	1.54	2.26
Silver	0.053	9.83%	0.048	0.058
Thallium	0.13	6.56%	0.12	0.14
Vanadium	18.0	3.31%	17.4	18.6
Zinc	53.1	5.42%	50.2	56.0
Other Inorganic Parameters (mg/kg)				
Cyanide	0.77	32.7%	0.52	1.02
Fluoride	861	28.8%	613	1,109
Essential Nutrients (mg/kg)				
Calcium	19,500	15.1%	16,548	22,452
Magnesium	11,000	2.18%	10,760	11,240
Potassium	2,490	6.91%	2,318	2,662
Sodium	3,280	21.1%	2,589	3,971
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-028			
	0.50-2.00			
	CFISS-028-SO-0.5-2			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.017	47.7%	0.009	0.025
Acenaphthene	0.095	80.9%	0.018	0.17
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.23	82.4%	0.041	0.42
Fluoranthene	2.70	71.4%	0.77	4.63
Fluorene	0.078	74.2%	0.020	0.14
Naphthalene	0.033	28.9%	0.023	0.043
Phenanthrene	1.30	78.1%	0.28	2.32
Total LMW PAHs - 1/2MDL	4.46	74.3%	1.15	7.77
Total LMW PAHs - MDL	4.46	74.3%	1.15	7.77
Total LMW PAHs - Zero	4.45	74.3%	1.15	7.76
Benzo(A)Pyrene	1.80	67.2%	0.59	3.01
Benzo(A)Anthracene	1.50	68.8%	0.47	2.53
Benzo(B)Fluoranthene	2.30	60.1%	0.92	3.68
Benzo(G,H,I)Perylene	1.70	60.8%	0.67	2.73
Benzo(K)Fluoranthene	0.79	64.5%	0.28	1.30
Chrysene	2.00	62.9%	0.74	3.26
Dibenz(A,H)Anthracene	0.46	63.9%	0.17	0.75
Indeno(1,2,3-C,D)Pyrene	1.80	62.0%	0.68	2.92
Pyrene	2.10	72.7%	0.57	3.63
Total HMW PAHs - 1/2MDL	14.5	64.7%	5.10	23.8
Total HMW PAHs - MDL	14.5	64.7%	5.10	23.8
Total HMW PAHs - Zero	14.5	64.7%	5.10	23.8
Total PAHs - 1/2MDL	16.6	68.3%	5.25	27.9
Total PAHs - MDL	16.6	68.3%	5.26	27.9
Total PAHs - Zero	16.6	68.3%	5.25	27.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-028			
	0.50-2.00			
	CFISS-028-SO-0.5-2			
	7/1/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.021	41.1%	0.012	0.030
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.032	--	0.032	0.032
Benzyl Butyl Phthalate	0.012	32.7%	0.008	0.016
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.046	--	0.046	0.046
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.22	76.1%	0.053	0.39
Dibenzofuran	0.041	70.0%	0.012	0.070
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.019	--	0.019	0.019
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.003	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.014	--	0.014	0.014

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-029			
	0.00-0.50			
	CFISS-029-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,900	4.68%	17,062	18,738
Antimony	0.24	28.1%	0.17	0.31
Arsenic	5.90	13.8%	5.08	6.72
Barium	120	4.03%	115	125
Beryllium	0.58	6.32%	0.54	0.62
Cadmium	0.24	15.0%	0.20	0.28
Chromium, Total	14.9	10.6%	13.3	16.5
Chromium, Hexavalent	0.40	10.6%	0.36	0.44
Chromium, Trivalent	14.5	10.6%	13.0	16.0
Cobalt	6.30	3.51%	6.08	6.52
Copper	65.1	12.3%	57.1	73.1
Iron	16,500	3.40%	15,939	17,061
Lead	16.6	48.5%	8.55	24.7
Manganese	445	5.63%	420	470
Mercury	0.024	54.9%	0.011	0.037
Nickel	25.2	14.5%	21.6	28.8
Selenium	1.70	20.0%	1.36	2.04
Silver	0.043	9.03%	0.039	0.047
Thallium	0.095	14.4%	0.081	0.11
Vanadium	14.7	9.21%	13.3	16.1
Zinc	75.5	12.7%	65.9	85.1
Other Inorganic Parameters (mg/kg)				
Cyanide	0.27	40.2%	0.16	0.38
Fluoride	39.9	20.5%	31.7	48.1
Essential Nutrients (mg/kg)				
Calcium	18,300	10.7%	16,348	20,252
Magnesium	11,200	2.82%	10,884	11,516
Potassium	1,330	6.24%	1,247	1,413
Sodium	87.2	30.7%	60.4	114
Pesticides (mg/kg)				
Aldrin	3.90E-04	--	3.90E-04	3.90E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.45E-04	--	4.45E-04	4.45E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.00E-04	--	5.00E-04	5.00E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.50E-04	--	3.50E-04	3.50E-04
Dieldrin	4.20E-04	--	4.20E-04	4.20E-04
Endosulfan Sulfate	3.75E-04	--	3.75E-04	3.75E-04
Endrin	4.10E-04	--	4.10E-04	4.10E-04
Endrin Aldehyde	4.00E-04	--	4.00E-04	4.00E-04
Endrin Ketone	4.45E-04	--	4.45E-04	4.45E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.15E-04	--	4.15E-04	4.15E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.25E-04	--	4.25E-04	4.25E-04
P,P'-DDE	4.65E-04	--	4.65E-04	4.65E-04
P,P'-DDT	3.30E-04	--	3.30E-04	3.30E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-029			
	0.00-0.50			
	CFISS-029-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	140%	-1.76E-03	0.011
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	140%	-1.76E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.008	47.1%	0.004	0.011
Acenaphthene	0.039	42.0%	0.023	0.055
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.079	37.7%	0.049	0.11
Fluoranthene	0.96	37.3%	0.60	1.32
Fluorene	0.027	34.6%	0.018	0.036
Naphthalene	0.012	44.9%	0.007	0.017
Phenanthrene	0.47	31.0%	0.32	0.62
Total LMW PAHs - 1/2MDL	1.60	35.8%	1.03	2.17
Total LMW PAHs - MDL	1.60	35.8%	1.03	2.18
Total LMW PAHs - Zero	1.59	35.9%	1.02	2.17
Benzo(A)Pyrene	0.85	36.1%	0.54	1.16
Benzo(A)Anthracene	0.67	32.0%	0.46	0.88
Benzo(B)Fluoranthene	1.40	29.8%	0.98	1.82
Benzo(G,H,I)Perylene	1.10	30.8%	0.76	1.44
Benzo(K)Fluoranthene	0.53	31.3%	0.36	0.70
Chrysene	0.95	35.9%	0.61	1.29
Dibenz(A,H)Anthracene	0.25	39.8%	0.15	0.35
Indeno(1,2,3-C,D)Pyrene	1.10	31.1%	0.76	1.44
Pyrene	1.30	39.3%	0.79	1.81
Total HMW PAHs - 1/2MDL	8.15	26.8%	5.97	10.3
Total HMW PAHs - MDL	8.15	26.8%	5.97	10.3
Total HMW PAHs - Zero	8.15	26.8%	5.97	10.3
Total PAHs - 1/2MDL	8.34	29.6%	5.88	10.8
Total PAHs - MDL	8.35	29.5%	5.88	10.8
Total PAHs - Zero	8.34	29.6%	5.87	10.8
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-029			
	0.00-0.50			
	CFISS-029-SO-0-0.5			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.020	44.4%	0.011	0.029
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.10	--	0.10	0.10
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.080	30.5%	0.056	0.10
Dibenzofuran	0.015	33.5%	0.010	0.020
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.067	--	0.067	0.067
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.012	--	0.012	0.012

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-029			
	0.50-2.00			
	CFISS-029-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,600	4.58%	14,886	16,314
Antimony	0.17	70.4%	0.050	0.29
Arsenic	6.40	7.46%	5.92	6.88
Barium	135	9.24%	123	147
Beryllium	0.53	4.90%	0.50	0.56
Cadmium	0.14	6.03%	0.13	0.15
Chromium, Total	17.1	7.75%	15.8	18.4
Chromium, Hexavalent	0.46	7.75%	0.42	0.49
Chromium, Trivalent	16.6	7.75%	15.4	17.9
Cobalt	6.40	1.99%	6.27	6.53
Copper	398	4.63%	380	416
Iron	17,300	2.40%	16,885	17,715
Lead	16.1	3.33%	15.6	16.6
Manganese	515	7.15%	478	552
Mercury	0.024	27.4%	0.017	0.031
Nickel	15.4	6.58%	14.4	16.4
Selenium	1.70	19.1%	1.38	2.02
Silver	0.053	9.83%	0.048	0.058
Thallium	0.089	6.56%	0.083	0.095
Vanadium	12.6	3.31%	12.2	13.0
Zinc	55.0	5.42%	52.0	58.0
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	32.7%	0.10	0.20
Fluoride	53.0	28.8%	37.7	68.3
Essential Nutrients (mg/kg)				
Calcium	17,300	15.1%	14,681	19,919
Magnesium	11,100	2.18%	10,858	11,342
Potassium	1,100	6.91%	1,024	1,176
Sodium	77.4	21.1%	61.1	93.7
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-029			
	0.50-2.00			
	CFISS-029-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.7%	0.002	0.005
Acenaphthene	0.014	80.9%	0.003	0.025
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.016	82.4%	0.003	0.028
Fluoranthene	0.22	71.4%	0.063	0.38
Fluorene	0.012	74.2%	0.003	0.021
Naphthalene	0.004	28.9%	0.003	0.005
Phenanthrene	0.14	78.1%	0.031	0.25
Total LMW PAHs - 1/2MDL	0.41	74.3%	0.11	0.72
Total LMW PAHs - MDL	0.44	74.3%	0.11	0.77
Total LMW PAHs - Zero	0.39	74.3%	0.099	0.67
Benzo(A)Pyrene	0.17	67.2%	0.056	0.28
Benzo(A)Anthracene	0.14	68.8%	0.044	0.24
Benzo(B)Fluoranthene	0.24	60.1%	0.096	0.38
Benzo(G,H,I)Perylene	0.18	60.8%	0.071	0.29
Benzo(K)Fluoranthene	0.095	64.5%	0.034	0.16
Chrysene	0.17	62.9%	0.063	0.28
Dibenz(A,H)Anthracene	0.055	63.9%	0.020	0.090
Indeno(1,2,3-C,D)Pyrene	0.18	62.0%	0.068	0.29
Pyrene	0.28	72.7%	0.076	0.48
Total HMW PAHs - 1/2MDL	1.51	64.7%	0.53	2.49
Total HMW PAHs - MDL	1.51	64.7%	0.53	2.49
Total HMW PAHs - Zero	1.51	64.7%	0.53	2.49
Total PAHs - 1/2MDL	1.68	68.3%	0.53	2.83
Total PAHs - MDL	1.70	68.3%	0.54	2.87
Total PAHs - Zero	1.66	68.3%	0.52	2.79
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-029			
	0.50-2.00			
	CFISS-029-SO-0.5-2			
	6/27/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.015	41.1%	0.009	0.021
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.049	--	0.049	0.049
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.025	76.1%	0.006	0.044
Dibenzofuran	0.005	70.0%	0.001	0.008
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.023	--	0.023	0.023
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-030			
	0.00-0.50			
	CFISS-030-SO-0-0.5			
	7/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	22,500	4.68%	21,446	23,554
Antimony	0.42	28.1%	0.30	0.54
Arsenic	6.20	13.8%	5.34	7.06
Barium	127	4.03%	122	132
Beryllium	0.80	6.32%	0.75	0.85
Cadmium	0.39	15.0%	0.33	0.45
Chromium, Total	18.5	10.6%	16.5	20.5
Chromium, Hexavalent	0.50	10.6%	0.44	0.55
Chromium, Trivalent	18.0	10.6%	16.1	19.9
Cobalt	6.30	3.51%	6.08	6.52
Copper	26.5	12.3%	23.2	29.8
Iron	15,500	3.40%	14,973	16,027
Lead	33.2	48.5%	17.1	49.3
Manganese	461	5.63%	435	487
Mercury	0.031	54.9%	0.014	0.048
Nickel	41.0	14.5%	35.1	46.9
Selenium	1.40	20.0%	1.12	1.68
Silver	0.073	9.03%	0.066	0.080
Thallium	0.11	14.4%	0.094	0.13
Vanadium	20.6	9.21%	18.7	22.5
Zinc	99.2	12.7%	86.6	112
Other Inorganic Parameters (mg/kg)				
Cyanide	0.40	40.2%	0.24	0.56
Fluoride	270	20.5%	215	325
Essential Nutrients (mg/kg)				
Calcium	27,500	10.7%	24,567	30,433
Magnesium	10,700	2.82%	10,398	11,002
Potassium	1,390	6.24%	1,303	1,477
Sodium	679	30.7%	470	888
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-030			
	0.00-0.50			
	CFISS-030-SO-0-0.5			
	7/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.031	47.1%	0.016	0.046
Acenaphthene	0.28	42.0%	0.16	0.40
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.66	37.7%	0.41	0.91
Fluoranthene	6.60	37.3%	4.14	9.06
Fluorene	0.17	34.6%	0.11	0.23
Naphthalene	0.063	44.9%	0.035	0.091
Phenanthrene	3.10	31.0%	2.14	4.06
Total LMW PAHs - 1/2MDL	10.9	35.8%	7.00	14.8
Total LMW PAHs - MDL	10.9	35.8%	7.01	14.8
Total LMW PAHs - Zero	10.9	35.9%	6.99	14.8
Benzo(A)Pyrene	5.50	36.1%	3.51	7.49
Benzo(A)Anthracene	4.50	32.0%	3.06	5.94
Benzo(B)Fluoranthene	6.50	29.8%	4.56	8.44
Benzo(G,H,I)Perylene	7.20	30.8%	4.98	9.42
Benzo(K)Fluoranthene	2.40	31.3%	1.65	3.15
Chrysene	5.60	35.9%	3.59	7.61
Dibenz(A,H)Anthracene	1.80	39.8%	1.08	2.52
Indeno(1,2,3-C,D)Pyrene	6.90	31.1%	4.75	9.05
Pyrene	7.10	39.3%	4.31	9.89
Total HMW PAHs - 1/2MDL	47.5	26.8%	34.8	60.2
Total HMW PAHs - MDL	47.5	26.8%	34.8	60.2
Total HMW PAHs - Zero	47.5	26.8%	34.8	60.2
Total PAHs - 1/2MDL	51.9	29.6%	36.5	67.2
Total PAHs - MDL	51.9	29.5%	36.6	67.2
Total PAHs - Zero	51.9	29.6%	36.5	67.2
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.024	--	0.024	0.024
1,4-Dioxane (P-Dioxane)	0.085	--	0.085	0.085
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.032	--	0.032	0.032
2,4,6-Trichlorophenol	0.009	--	0.009	0.009
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.070	--	0.070	0.070

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-030			
	0.00-0.50			
	CFISS-030-SO-0-0.5			
	7/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.017	--	0.017	0.017
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.008	--	0.008	0.008
2-Methylphenol (O-Cresol)	0.014	--	0.014	0.014
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.036	--	0.036	0.036
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.085	--	0.085	0.085
4-Bromophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.012	--	0.012	0.012
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.048	--	0.048	0.048
Biphenyl (Diphenyl)	0.028	49.7%	0.014	0.041
Bis(2-Chloroethoxy) Methane	0.010	--	0.010	0.010
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.013	--	0.013	0.013
Bis(2-Ethylhexyl) Phthalate	0.058	--	0.058	0.058
Caprolactam	0.023	--	0.023	0.023
Carbazole	0.52	30.5%	0.36	0.68
Dibenzofuran	0.085	33.5%	0.057	0.11
Diethyl Phthalate	0.009	--	0.009	0.009
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.013	--	0.013	0.013
Hexachlorobutadiene	0.009	--	0.009	0.009
Hexachlorocyclopentadiene	0.020	--	0.020	0.020
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.010	--	0.010	0.010
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.029	--	0.029	0.029
Pentachlorophenol	0.039	--	0.039	0.039
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-030			
	0.50-2.00			
	CFISS-030-SO-0.5-2			
	7/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	16,200	4.58%	15,459	16,941
Antimony	0.12	70.4%	0.035	0.20
Arsenic	4.70	7.46%	4.35	5.05
Barium	157	9.24%	142	172
Beryllium	0.61	4.90%	0.58	0.64
Cadmium	0.16	6.03%	0.15	0.17
Chromium, Total	17.0	7.75%	15.7	18.3
Chromium, Hexavalent	0.45	7.75%	0.42	0.49
Chromium, Trivalent	16.5	7.75%	15.3	17.8
Cobalt	5.80	1.99%	5.68	5.92
Copper	20.8	4.63%	19.8	21.8
Iron	15,200	2.40%	14,835	15,565
Lead	16.8	3.33%	16.2	17.4
Manganese	494	7.15%	459	529
Mercury	0.016	27.4%	0.012	0.020
Nickel	18.6	6.58%	17.4	19.8
Selenium	1.40	19.1%	1.13	1.67
Silver	0.040	9.83%	0.036	0.044
Thallium	0.089	6.56%	0.083	0.095
Vanadium	14.4	3.31%	13.9	14.9
Zinc	61.6	5.42%	58.3	64.9
Other Inorganic Parameters (mg/kg)				
Cyanide	0.18	32.7%	0.12	0.24
Fluoride	297	28.8%	212	382
Essential Nutrients (mg/kg)				
Calcium	20,800	15.1%	17,651	23,949
Magnesium	10,300	2.18%	10,075	10,525
Potassium	1,070	6.91%	996	1,144
Sodium	413	21.1%	326	500
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-030			
	0.50-2.00			
	CFISS-030-SO-0.5-2			
	7/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.010	47.7%	0.005	0.014
Acenaphthene	0.050	80.9%	0.010	0.090
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.10	82.4%	0.018	0.18
Fluoranthene	1.00	71.4%	0.29	1.71
Fluorene	0.039	74.2%	0.010	0.068
Naphthalene	0.020	28.9%	0.014	0.026
Phenanthrene	0.56	78.1%	0.12	1.00
Total LMW PAHs - 1/2MDL	1.78	74.3%	0.46	3.11
Total LMW PAHs - MDL	1.79	74.3%	0.46	3.11
Total LMW PAHs - Zero	1.78	74.3%	0.46	3.10
Benzo(A)Pyrene	0.88	67.2%	0.29	1.47
Benzo(A)Anthracene	0.64	68.8%	0.20	1.08
Benzo(B)Fluoranthene	1.20	60.1%	0.48	1.92
Benzo(G,H,I)Perylene	0.86	60.8%	0.34	1.38
Benzo(K)Fluoranthene	0.38	64.5%	0.13	0.63
Chrysene	0.84	62.9%	0.31	1.37
Dibenz(A,H)Anthracene	0.19	63.9%	0.069	0.31
Indeno(1,2,3-C,D)Pyrene	0.88	62.0%	0.33	1.43
Pyrene	1.20	72.7%	0.33	2.07
Total HMW PAHs - 1/2MDL	7.07	64.7%	2.49	11.6
Total HMW PAHs - MDL	7.07	64.7%	2.49	11.6
Total HMW PAHs - Zero	7.07	64.7%	2.49	11.6
Total PAHs - 1/2MDL	7.64	68.3%	2.42	12.9
Total PAHs - MDL	7.65	68.3%	2.42	12.9
Total PAHs - Zero	7.64	68.3%	2.42	12.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.035	--	0.035	0.035

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-030			
	0.50-2.00			
	CFISS-030-SO-0.5-2			
	7/25/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.075	--	0.075	0.075
Acetophenone	0.003	41.1%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.012	--	0.012	0.012
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.43E-04	0.027
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.006	--	0.006	0.006
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.087	76.1%	0.021	0.15
Dibenzofuran	0.021	70.0%	0.006	0.036
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.003	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.005	--	0.005	0.005

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-031			
	0.00-0.50			
	CFISS-031-SO-0-0.5			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	29,300	4.68%	27,928	30,672
Antimony	0.39	28.1%	0.28	0.50
Arsenic	5.50	13.8%	4.74	6.26
Barium	116	4.03%	111	121
Beryllium	1.10	6.32%	1.03	1.17
Cadmium	0.59	15.0%	0.50	0.68
Chromium, Total	20.1	10.6%	18.0	22.2
Chromium, Hexavalent	0.54	10.6%	0.48	0.59
Chromium, Trivalent	19.6	10.6%	17.5	21.6
Cobalt	5.80	3.51%	5.60	6.00
Copper	35.7	12.3%	31.3	40.1
Iron	16,900	3.40%	16,326	17,474
Lead	24.8	48.5%	12.8	36.8
Manganese	387	5.63%	365	409
Mercury	0.008	54.9%	0.003	0.012
Nickel	47.6	14.5%	40.7	54.5
Selenium	1.00	20.0%	0.80	1.20
Silver	0.066	9.03%	0.060	0.072
Thallium	0.12	14.4%	0.10	0.14
Vanadium	21.9	9.21%	19.9	23.9
Zinc	90.8	12.7%	79.3	102
Other Inorganic Parameters (mg/kg)				
Cyanide	0.80	40.2%	0.48	1.12
Fluoride	391	20.5%	311	471
Essential Nutrients (mg/kg)				
Calcium	17,300	10.7%	15,455	19,145
Magnesium	8,230	2.82%	7,998	8,462
Potassium	1,620	6.24%	1,519	1,721
Sodium	1,490	30.7%	1,032	1,948
Pesticides (mg/kg)				
Aldrin	4.10E-04	--	4.10E-04	4.10E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.10E-04	--	3.10E-04	3.10E-04
Alpha Endosulfan	4.75E-04	--	4.75E-04	4.75E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.30E-04	--	3.30E-04	3.30E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.70E-04	--	3.70E-04	3.70E-04
Dieldrin	4.40E-04	--	4.40E-04	4.40E-04
Endosulfan Sulfate	3.95E-04	--	3.95E-04	3.95E-04
Endrin	4.30E-04	--	4.30E-04	4.30E-04
Endrin Aldehyde	4.20E-04	--	4.20E-04	4.20E-04
Endrin Ketone	4.75E-04	--	4.75E-04	4.75E-04
Gamma Bhc (Lindane)	3.05E-04	--	3.05E-04	3.05E-04
Heptachlor	4.35E-04	--	4.35E-04	4.35E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.45E-04	--	4.45E-04	4.45E-04
P,P'-DDE	4.95E-04	--	4.95E-04	4.95E-04
P,P'-DDT	3.50E-04	--	3.50E-04	3.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-031			
	0.00-0.50			
	CFISS-031-SO-0-0.5			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	140%	-1.86E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.86E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.011	47.1%	0.006	0.016
Acenaphthene	0.040	42.0%	0.023	0.057
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.13	37.7%	0.081	0.18
Fluoranthene	1.60	37.3%	1.00	2.20
Fluorene	0.038	34.6%	0.025	0.051
Naphthalene	0.018	44.9%	0.010	0.026
Phenanthrene	1.00	31.0%	0.69	1.31
Total LMW PAHs - 1/2MDL	2.84	35.8%	1.82	3.86
Total LMW PAHs - MDL	2.85	35.8%	1.83	3.86
Total LMW PAHs - Zero	2.84	35.9%	1.82	3.86
Benzo(A)Pyrene	0.59	36.1%	0.38	0.80
Benzo(A)Anthracene	0.60	32.0%	0.41	0.79
Benzo(B)Fluoranthene	1.00	29.8%	0.70	1.30
Benzo(G,H,I)Perylene	0.75	30.8%	0.52	0.98
Benzo(K)Fluoranthene	0.31	31.3%	0.21	0.41
Chrysene	0.98	35.9%	0.63	1.33
Dibenz(A,H)Anthracene	0.19	39.8%	0.11	0.27
Indeno(1,2,3-C,D)Pyrene	0.71	31.1%	0.49	0.93
Pyrene	1.10	39.3%	0.67	1.53
Total HMW PAHs - 1/2MDL	6.23	26.8%	4.56	7.90
Total HMW PAHs - MDL	6.23	26.8%	4.56	7.90
Total HMW PAHs - Zero	6.23	26.8%	4.56	7.90
Total PAHs - 1/2MDL	8.06	29.6%	5.68	10.4
Total PAHs - MDL	8.06	29.5%	5.68	10.4
Total PAHs - Zero	8.06	29.6%	5.67	10.4
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-031			
	0.00-0.50			
	CFISS-031-SO-0-0.5			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.13	30.5%	0.090	0.17
Dibenzofuran	0.036	33.5%	0.024	0.048
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-031			
	0.50-2.00			
	CFISS-031-SO-0.5-2			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,300	4.58%	16,508	18,092
Antimony	0.12	70.4%	0.035	0.20
Arsenic	4.80	7.46%	4.44	5.16
Barium	195	9.24%	177	213
Beryllium	0.65	4.90%	0.62	0.68
Cadmium	0.14	6.03%	0.13	0.15
Chromium, Total	17.0	7.75%	15.7	18.3
Chromium, Hexavalent	0.45	7.75%	0.42	0.49
Chromium, Trivalent	16.5	7.75%	15.3	17.8
Cobalt	6.60	1.99%	6.47	6.73
Copper	16.8	4.63%	16.0	17.6
Iron	16,800	2.40%	16,397	17,203
Lead	13.3	3.33%	12.9	13.7
Manganese	592	7.15%	550	634
Mercury	0.009	27.4%	0.006	0.011
Nickel	16.4	6.58%	15.3	17.5
Selenium	1.20	19.1%	0.97	1.43
Silver	0.040	9.83%	0.036	0.044
Thallium	0.098	6.56%	0.092	0.10
Vanadium	15.5	3.31%	15.0	16.0
Zinc	57.3	5.42%	54.2	60.4
Other Inorganic Parameters (mg/kg)				
Cyanide	0.24	32.7%	0.16	0.32
Fluoride	96.0	28.8%	68.4	124
Essential Nutrients (mg/kg)				
Calcium	11,900	15.1%	10,098	13,702
Magnesium	8,910	2.18%	8,716	9,104
Potassium	1,030	6.91%	959	1,101
Sodium	193	21.1%	152	234
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-031			
	0.50-2.00			
	CFISS-031-SO-0.5-2			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.008	47.7%	0.004	0.011
Acenaphthene	0.040	80.9%	0.008	0.072
Acenaphthylene	0.009	62.8%	0.003	0.014
Anthracene	0.12	82.4%	0.021	0.22
Fluoranthene	1.40	71.4%	0.40	2.40
Fluorene	0.035	74.2%	0.009	0.061
Naphthalene	0.018	28.9%	0.013	0.023
Phenanthrene	0.99	78.1%	0.22	1.76
Total LMW PAHs - 1/2MDL	2.62	74.3%	0.67	4.56
Total LMW PAHs - MDL	2.64	74.3%	0.68	4.59
Total LMW PAHs - Zero	2.60	74.3%	0.67	4.54
Benzo(A)Pyrene	0.57	67.2%	0.19	0.95
Benzo(A)Anthracene	0.57	68.8%	0.18	0.96
Benzo(B)Fluoranthene	1.00	60.1%	0.40	1.60
Benzo(G,H,I)Perylene	0.64	60.8%	0.25	1.03
Benzo(K)Fluoranthene	0.35	64.5%	0.12	0.58
Chrysene	0.92	62.9%	0.34	1.50
Dibenz(A,H)Anthracene	0.13	63.9%	0.047	0.21
Indeno(1,2,3-C,D)Pyrene	0.57	62.0%	0.22	0.92
Pyrene	1.30	72.7%	0.35	2.25
Total HMW PAHs - 1/2MDL	6.05	64.7%	2.13	9.97
Total HMW PAHs - MDL	6.05	64.7%	2.13	9.97
Total HMW PAHs - Zero	6.05	64.7%	2.13	9.97
Total PAHs - 1/2MDL	7.66	68.3%	2.43	12.9
Total PAHs - MDL	7.67	68.3%	2.43	12.9
Total PAHs - Zero	7.65	68.3%	2.42	12.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.032	--	0.032	0.032
2,4,5-Trichlorophenol	0.034	--	0.034	0.034
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-031			
	0.50-2.00			
	CFISS-031-SO-0.5-2			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.26	--	0.26	0.26
2,4-Dinitrotoluene	0.014	--	0.014	0.014
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.012	--	0.012	0.012
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.038	--	0.038	0.038
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.015	--	0.015	0.015
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.17	--	0.17	0.17
Acetophenone	0.008	41.1%	0.004	0.011
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.026	--	0.026	0.026
Benzyl Butyl Phthalate	0.011	32.7%	0.007	0.014
Biphenyl (Diphenyl)	0.029	98.2%	5.22E-04	0.057
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.025	--	0.025	0.025
Carbazole	0.13	76.1%	0.031	0.23
Dibenzofuran	0.035	70.0%	0.010	0.060
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.013	--	0.013	0.013
Isophorone	0.008	32.5%	0.005	0.010
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.012	--	0.012	0.012
N-Nitrosodiphenylamine	0.031	--	0.031	0.031
Pentachlorophenol	0.041	--	0.041	0.041
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-032			
	0.00-0.50			
	CFISS-032-SO-0-0.5			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	23,800	4.68%	22,686	24,914
Antimony	0.20	28.1%	0.14	0.26
Arsenic	6.30	13.8%	5.43	7.17
Barium	245	4.03%	235	255
Beryllium	0.93	6.32%	0.87	0.99
Cadmium	0.28	15.0%	0.24	0.32
Chromium, Total	17.1	10.6%	15.3	18.9
Chromium, Hexavalent	0.46	10.6%	0.41	0.51
Chromium, Trivalent	16.6	10.6%	14.9	18.4
Cobalt	7.10	3.51%	6.85	7.35
Copper	23.3	12.3%	20.4	26.2
Iron	18,900	3.40%	18,258	19,542
Lead	19.2	48.5%	9.89	28.5
Manganese	457	5.63%	431	483
Mercury	0.049	54.9%	0.022	0.076
Nickel	26.2	14.5%	22.4	30.0
Selenium	2.10	20.0%	1.68	2.52
Silver	0.063	9.03%	0.057	0.069
Thallium	0.10	14.4%	0.086	0.11
Vanadium	19.9	9.21%	18.1	21.7
Zinc	75.2	12.7%	65.6	84.8
Other Inorganic Parameters (mg/kg)				
Cyanide	0.31	40.2%	0.19	0.43
Fluoride	59.3	20.5%	47.1	71.5
Essential Nutrients (mg/kg)				
Calcium	13,300	10.7%	11,881	14,719
Magnesium	9,530	2.82%	9,261	9,799
Potassium	1,320	6.24%	1,238	1,402
Sodium	205	30.7%	142	268
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-032			
	0.00-0.50			
	CFISS-032-SO-0-0.5			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.80E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.80E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.013	47.1%	0.007	0.019
Acenaphthene	0.12	42.0%	0.070	0.17
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.25	37.7%	0.16	0.34
Fluoranthene	2.30	37.3%	1.44	3.16
Fluorene	0.079	34.6%	0.052	0.11
Naphthalene	0.018	44.9%	0.010	0.026
Phenanthrene	1.50	31.0%	1.03	1.97
Total LMW PAHs - 1/2MDL	4.28	35.8%	2.75	5.82
Total LMW PAHs - MDL	4.29	35.8%	2.75	5.82
Total LMW PAHs - Zero	4.28	35.9%	2.74	5.82
Benzo(A)Pyrene	1.90	36.1%	1.21	2.59
Benzo(A)Anthracene	1.60	32.0%	1.09	2.11
Benzo(B)Fluoranthene	2.30	29.8%	1.61	2.99
Benzo(G,H,I)Perylene	1.60	30.8%	1.11	2.09
Benzo(K)Fluoranthene	0.88	31.3%	0.60	1.16
Chrysene	2.00	35.9%	1.28	2.72
Dibenz(A,H)Anthracene	0.44	39.8%	0.26	0.62
Indeno(1,2,3-C,D)Pyrene	1.70	31.1%	1.17	2.23
Pyrene	2.90	39.3%	1.76	4.04
Total HMW PAHs - 1/2MDL	15.3	26.8%	11.2	19.4
Total HMW PAHs - MDL	15.3	26.8%	11.2	19.4
Total HMW PAHs - Zero	15.3	26.8%	11.2	19.4
Total PAHs - 1/2MDL	17.3	29.6%	12.2	22.4
Total PAHs - MDL	17.3	29.5%	12.2	22.4
Total PAHs - Zero	17.3	29.6%	12.2	22.4
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-032			
	0.00-0.50			
	CFISS-032-SO-0-0.5			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.23	30.5%	0.16	0.30
Dibenzofuran	0.037	33.5%	0.025	0.049
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.018	--	0.018	0.018
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-032			
	0.50-2.00			
	CFISS-032-SO-0.5-2			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	20,000	4.58%	19,085	20,915
Antimony	0.15	70.4%	0.044	0.26
Arsenic	5.20	7.46%	4.81	5.59
Barium	161	9.24%	146	176
Beryllium	0.85	4.90%	0.81	0.89
Cadmium	0.14	6.03%	0.13	0.15
Chromium, Total	15.9	7.75%	14.7	17.1
Chromium, Hexavalent	0.43	7.75%	0.39	0.46
Chromium, Trivalent	15.5	7.75%	14.3	16.7
Cobalt	6.10	1.99%	5.98	6.22
Copper	30.7	4.63%	29.3	32.1
Iron	17,100	2.40%	16,689	17,511
Lead	11.9	3.33%	11.5	12.3
Manganese	413	7.15%	383	443
Mercury	0.009	27.4%	0.006	0.011
Nickel	17.5	6.58%	16.3	18.7
Selenium	1.70	19.1%	1.38	2.02
Silver	0.045	9.83%	0.041	0.049
Thallium	0.094	6.56%	0.088	0.10
Vanadium	15.4	3.31%	14.9	15.9
Zinc	84.9	5.42%	80.3	89.5
Other Inorganic Parameters (mg/kg)				
Cyanide	1.20	32.7%	0.81	1.59
Fluoride	519	28.8%	370	668
Essential Nutrients (mg/kg)				
Calcium	17,500	15.1%	14,850	20,150
Magnesium	10,100	2.18%	9,880	10,320
Potassium	1,350	6.91%	1,257	1,443
Sodium	1,170	21.1%	923	1,417
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-032			
	0.50-2.00			
	CFISS-032-SO-0.5-2			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.012	47.7%	0.006	0.018
Acenaphthene	0.067	80.9%	0.013	0.12
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.17	82.4%	0.030	0.31
Fluoranthene	1.20	71.4%	0.34	2.06
Fluorene	0.048	74.2%	0.012	0.084
Naphthalene	0.035	28.9%	0.025	0.045
Phenanthrene	0.78	78.1%	0.17	1.39
Total LMW PAHs - 1/2MDL	2.32	74.3%	0.60	4.04
Total LMW PAHs - MDL	2.32	74.3%	0.60	4.04
Total LMW PAHs - Zero	2.31	74.3%	0.60	4.03
Benzo(A)Pyrene	1.20	67.2%	0.39	2.01
Benzo(A)Anthracene	1.10	68.8%	0.34	1.86
Benzo(B)Fluoranthene	1.30	60.1%	0.52	2.08
Benzo(G,H,I)Perylene	0.98	60.8%	0.38	1.58
Benzo(K)Fluoranthene	0.61	64.5%	0.22	1.00
Chrysene	1.20	62.9%	0.44	1.96
Dibenz(A,H)Anthracene	0.27	63.9%	0.098	0.44
Indeno(1,2,3-C,D)Pyrene	1.00	62.0%	0.38	1.62
Pyrene	1.70	72.7%	0.46	2.94
Total HMW PAHs - 1/2MDL	9.36	64.7%	3.30	15.4
Total HMW PAHs - MDL	9.36	64.7%	3.30	15.4
Total HMW PAHs - Zero	9.36	64.7%	3.30	15.4
Total PAHs - 1/2MDL	10.4	68.3%	3.28	17.4
Total PAHs - MDL	10.4	68.3%	3.28	17.5
Total PAHs - Zero	10.4	68.3%	3.28	17.4
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-032			
	0.50-2.00			
	CFISS-032-SO-0.5-2			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.13	76.1%	0.031	0.23
Dibenzofuran	0.027	70.0%	0.008	0.046
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.023	--	0.023	0.023
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-033			
	0.00-0.50			
	CFISS-033-SO-0-0.5			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	36,200	4.68%	34,505	37,895
Antimony	1.00	28.1%	0.72	1.28
Arsenic	8.60	13.8%	7.41	9.79
Barium	262	4.03%	251	273
Beryllium	1.50	6.32%	1.41	1.59
Cadmium	1.60	15.0%	1.36	1.84
Chromium, Total	33.8	10.6%	30.2	37.4
Chromium, Hexavalent	0.90	10.6%	0.81	1.00
Chromium, Trivalent	32.9	10.6%	29.4	36.4
Cobalt	8.20	3.51%	7.91	8.49
Copper	93.3	12.3%	81.8	105
Iron	23,100	3.40%	22,315	23,885
Lead	84.6	48.5%	43.6	126
Manganese	534	5.63%	504	564
Mercury	0.009	54.9%	0.004	0.013
Nickel	62.8	14.5%	53.7	71.9
Selenium	2.60	20.0%	2.08	3.12
Silver	0.16	9.03%	0.15	0.17
Thallium	0.18	14.4%	0.15	0.21
Vanadium	44.5	9.21%	40.4	48.6
Zinc	158	12.7%	138	178
Other Inorganic Parameters (mg/kg)				
Cyanide	0.81	40.2%	0.48	1.14
Fluoride	544	20.5%	432	656
Essential Nutrients (mg/kg)				
Calcium	9,200	10.7%	8,219	10,181
Magnesium	9,350	2.82%	9,086	9,614
Potassium	1,920	6.24%	1,800	2,040
Sodium	3,050	30.7%	2,112	3,988
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-033			
	0.00-0.50			
	CFISS-033-SO-0-0.5			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.075	47.1%	0.040	0.11
Acenaphthene	1.50	42.0%	0.87	2.13
Acenaphthylene	0.085	36.1%	0.054	0.12
Anthracene	4.60	37.7%	2.87	6.33
Fluoranthene	42.0	37.3%	26.3	57.7
Fluorene	0.67	34.6%	0.44	0.90
Naphthalene	0.085	44.9%	0.047	0.12
Phenanthrene	18.0	31.0%	12.4	23.6
Total LMW PAHs - 1/2MDL	67.0	35.8%	43.0	91.0
Total LMW PAHs - MDL	67.3	35.8%	43.2	91.3
Total LMW PAHs - Zero	66.8	35.9%	42.8	90.7
Benzo(A)Pyrene	44.0	36.1%	28.1	59.9
Benzo(A)Anthracene	37.0	32.0%	25.1	48.9
Benzo(B)Fluoranthene	50.0	29.8%	35.1	64.9
Benzo(G,H,I)Perylene	37.0	30.8%	25.6	48.4
Benzo(K)Fluoranthene	21.0	31.3%	14.4	27.6
Chrysene	39.0	35.9%	25.0	53.0
Dibenz(A,H)Anthracene	9.10	39.8%	5.48	12.7
Indeno(1,2,3-C,D)Pyrene	40.0	31.1%	27.6	52.4
Pyrene	48.0	39.3%	29.1	66.9
Total HMW PAHs - 1/2MDL	325	26.8%	238	412
Total HMW PAHs - MDL	325	26.8%	238	412
Total HMW PAHs - Zero	325	26.8%	238	412
Total PAHs - 1/2MDL	342	29.6%	241	443
Total PAHs - MDL	342	29.5%	241	443
Total PAHs - Zero	342	29.6%	241	443
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.25	--	0.25	0.25
1,4-Dioxane (P-Dioxane)	0.90	--	0.90	0.90
2,3,4,6-Tetrachlorophenol	0.32	--	0.32	0.32
2,4,5-Trichlorophenol	0.34	--	0.34	0.34
2,4,6-Trichlorophenol	0.095	--	0.095	0.095
2,4-Dichlorophenol	0.080	--	0.080	0.080
2,4-Dimethylphenol	0.75	--	0.75	0.75

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-033			
	0.00-0.50			
	CFISS-033-SO-0-0.5			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	2.55	--	2.55	2.55
2,4-Dinitrotoluene	0.14	--	0.14	0.14
2,6-Dinitrotoluene	0.18	--	0.18	0.18
2-Chloronaphthalene	0.075	--	0.075	0.075
2-Chlorophenol	0.085	--	0.085	0.085
2-Methylphenol (O-Cresol)	0.15	--	0.15	0.15
2-Nitroaniline	0.11	--	0.11	0.11
2-Nitrophenol	0.12	--	0.12	0.12
3- And 4- Methylphenol (Total)	0.090	--	0.090	0.090
3,3'-Dichlorobenzidine	0.38	--	0.38	0.38
3-Nitroaniline	0.10	--	0.10	0.10
4,6-Dinitro-2-Methylphenol	0.90	--	0.90	0.90
4-Bromophenyl Phenyl Ether	0.11	--	0.11	0.11
4-Chloro-3-Methylphenol	0.15	--	0.15	0.15
4-Chloroaniline	0.085	--	0.085	0.085
4-Chlorophenyl Phenyl Ether	0.10	--	0.10	0.10
4-Nitroaniline	0.13	--	0.13	0.13
4-Nitrophenol	1.60	--	1.60	1.60
Acetophenone	0.075	44.4%	0.042	0.11
Atrazine	0.15	--	0.15	0.15
Benzaldehyde	0.26	--	0.26	0.26
Benzyl Butyl Phthalate	0.59	--	0.59	0.59
Biphenyl (Diphenyl)	0.29	49.7%	0.14	0.43
Bis(2-Chloroethoxy) Methane	0.11	--	0.11	0.11
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.080	--	0.080	0.080
Bis(2-Chloroisopropyl) Ether	0.14	--	0.14	0.14
Bis(2-Ethylhexyl) Phthalate	0.13	--	0.13	0.13
Caprolactam	0.24	--	0.24	0.24
Carbazole	3.20	30.5%	2.22	4.18
Dibenzofuran	0.23	33.5%	0.15	0.31
Diethyl Phthalate	0.095	--	0.095	0.095
Dimethyl Phthalate	0.10	--	0.10	0.10
Di-N-Butyl Phthalate	0.10	--	0.10	0.10
Di-N-Octylphthalate	0.17	--	0.17	0.17
Hexachlorobenzene	0.14	--	0.14	0.14
Hexachlorobutadiene	0.095	--	0.095	0.095
Hexachlorocyclopentadiene	0.21	--	0.21	0.21
Hexachloroethane	0.13	--	0.13	0.13
Isophorone	0.070	--	0.070	0.070
Nitrobenzene	0.11	--	0.11	0.11
N-Nitrosodi-N-Propylamine	0.12	--	0.12	0.12
N-Nitrosodiphenylamine	0.31	--	0.31	0.31
Pentachlorophenol	0.41	--	0.41	0.41
Phenol	0.11	--	0.11	0.11

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-033			
	0.50-2.00			
	CFISS-033-SO-0.5-2			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	14,600	4.58%	13,932	15,268
Antimony	0.43	70.4%	0.13	0.73
Arsenic	5.10	7.46%	4.72	5.48
Barium	128	9.24%	116	140
Beryllium	0.59	4.90%	0.56	0.62
Cadmium	0.28	6.03%	0.26	0.30
Chromium, Total	14.1	7.75%	13.0	15.2
Chromium, Hexavalent	0.38	7.75%	0.35	0.41
Chromium, Trivalent	13.7	7.75%	12.7	14.8
Cobalt	6.40	1.99%	6.27	6.53
Copper	16.9	4.63%	16.1	17.7
Iron	16,400	2.40%	16,006	16,794
Lead	12.1	3.33%	11.7	12.5
Manganese	431	7.15%	400	462
Mercury	0.007	27.4%	0.005	0.009
Nickel	17.1	6.58%	16.0	18.2
Selenium	1.80	19.1%	1.46	2.14
Silver	0.033	9.83%	0.030	0.036
Thallium	0.079	6.56%	0.074	0.084
Vanadium	12.6	3.31%	12.2	13.0
Zinc	52.0	5.42%	49.2	54.8
Other Inorganic Parameters (mg/kg)				
Cyanide	0.15	32.7%	0.10	0.20
Fluoride	152	28.8%	108	196
Essential Nutrients (mg/kg)				
Calcium	19,900	15.1%	16,887	22,913
Magnesium	11,300	2.18%	11,054	11,546
Potassium	921	6.91%	857	985
Sodium	233	21.1%	184	282
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-033			
	0.50-2.00			
	CFISS-033-SO-0.5-2			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.7%	0.002	0.005
Acenaphthene	0.12	80.9%	0.023	0.22
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.36	82.4%	0.063	0.66
Fluoranthene	2.70	71.4%	0.77	4.63
Fluorene	0.045	74.2%	0.012	0.078
Naphthalene	0.004	28.9%	0.003	0.005
Phenanthrene	1.30	78.1%	0.28	2.32
Total LMW PAHs - 1/2MDL	4.54	74.3%	1.17	7.91
Total LMW PAHs - MDL	4.55	74.3%	1.17	7.93
Total LMW PAHs - Zero	4.53	74.3%	1.16	7.89
Benzo(A)Pyrene	3.30	67.2%	1.08	5.52
Benzo(A)Anthracene	2.60	68.8%	0.81	4.39
Benzo(B)Fluoranthene	3.50	60.1%	1.40	5.60
Benzo(G,H,I)Perylene	2.90	60.8%	1.14	4.66
Benzo(K)Fluoranthene	1.50	64.5%	0.53	2.47
Chrysene	2.80	62.9%	1.04	4.56
Dibenz(A,H)Anthracene	0.74	63.9%	0.27	1.21
Indeno(1,2,3-C,D)Pyrene	3.00	62.0%	1.14	4.86
Pyrene	3.20	72.7%	0.87	5.53
Total HMW PAHs - 1/2MDL	23.5	64.7%	8.31	38.8
Total HMW PAHs - MDL	23.5	64.7%	8.31	38.8
Total HMW PAHs - Zero	23.5	64.7%	8.31	38.8
Total PAHs - 1/2MDL	24.6	68.3%	7.78	41.4
Total PAHs - MDL	24.6	68.3%	7.79	41.4
Total PAHs - Zero	24.6	68.3%	7.78	41.4
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-033			
	0.50-2.00			
	CFISS-033-SO-0.5-2			
	7/12/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.23	76.1%	0.055	0.41
Dibenzofuran	0.018	70.0%	0.005	0.031
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.025	--	0.025	0.025
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-034			
	0.00-0.50			
	CFISS-034-SO-0-0.5			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	29,900	4.68%	28,500	31,300
Antimony	2.00	28.1%	1.44	2.56
Arsenic	6.20	13.8%	5.34	7.06
Barium	286	4.03%	274	298
Beryllium	1.40	6.32%	1.31	1.49
Cadmium	0.31	15.0%	0.26	0.36
Chromium, Total	16.7	10.6%	14.9	18.5
Chromium, Hexavalent	0.45	10.6%	0.40	0.49
Chromium, Trivalent	16.3	10.6%	14.5	18.0
Cobalt	6.50	3.51%	6.27	6.73
Copper	23.1	12.3%	20.3	25.9
Iron	17,500	3.40%	16,905	18,095
Lead	50.0	48.5%	25.7	74.3
Manganese	425	5.63%	401	449
Mercury	0.009	54.9%	0.004	0.013
Nickel	21.6	14.5%	18.5	24.7
Selenium	2.50	20.0%	2.00	3.00
Silver	0.25	9.03%	0.23	0.27
Thallium	0.22	14.4%	0.19	0.25
Vanadium	19.8	9.21%	18.0	21.6
Zinc	72.3	12.7%	63.1	81.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.50	40.2%	0.30	0.70
Fluoride	301	20.5%	239	363
Essential Nutrients (mg/kg)				
Calcium	9,730	10.7%	8,692	10,768
Magnesium	10,500	2.82%	10,204	10,796
Potassium	1,830	6.24%	1,716	1,944
Sodium	1,360	30.7%	942	1,778
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-034			
	0.00-0.50			
	CFISS-034-SO-0-0.5			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.090	47.1%	0.048	0.13
Acenaphthene	4.60	42.0%	2.67	6.53
Acenaphthylene	0.11	36.1%	0.067	0.14
Anthracene	15.0	37.7%	9.35	20.6
Fluoranthene	120	37.3%	75.2	165
Fluorene	1.80	34.6%	1.18	2.42
Naphthalene	0.11	44.9%	0.058	0.15
Phenanthrene	52.0	31.0%	35.9	68.1
Total LMW PAHs - 1/2MDL	194	35.8%	124	263
Total LMW PAHs - MDL	194	35.8%	125	263
Total LMW PAHs - Zero	193	35.9%	124	263
Benzo(A)Pyrene	110	36.1%	70.2	150
Benzo(A)Anthracene	100	32.0%	68.0	132
Benzo(B)Fluoranthene	130	29.8%	91.2	169
Benzo(G,H,I)Perylene	90.0	30.8%	62.3	118
Benzo(K)Fluoranthene	47.0	31.3%	32.3	61.7
Chrysene	100	35.9%	64.1	136
Dibenz(A,H)Anthracene	26.0	39.8%	15.6	36.4
Indeno(1,2,3-C,D)Pyrene	100	31.1%	68.9	131
Pyrene	120	39.3%	72.8	167
Total HMW PAHs - 1/2MDL	823	26.8%	602	1,044
Total HMW PAHs - MDL	823	26.8%	602	1,044
Total HMW PAHs - Zero	823	26.8%	602	1,044
Total PAHs - 1/2MDL	887	29.6%	625	1,149
Total PAHs - MDL	887	29.5%	625	1,149
Total PAHs - Zero	886	29.6%	624	1,148
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.31	--	0.31	0.31
1,4-Dioxane (P-Dioxane)	1.10	--	1.10	1.10
2,3,4,6-Tetrachlorophenol	0.39	--	0.39	0.39
2,4,5-Trichlorophenol	0.41	--	0.41	0.41
2,4,6-Trichlorophenol	0.12	--	0.12	0.12
2,4-Dichlorophenol	0.095	--	0.095	0.095
2,4-Dimethylphenol	0.90	--	0.90	0.90

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-034			
	0.00-0.50			
	CFISS-034-SO-0-0.5			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	3.10	--	3.10	3.10
2,4-Dinitrotoluene	0.16	--	0.16	0.16
2,6-Dinitrotoluene	0.22	--	0.22	0.22
2-Chloronaphthalene	0.090	--	0.090	0.090
2-Chlorophenol	0.11	--	0.11	0.11
2-Methylphenol (O-Cresol)	0.18	--	0.18	0.18
2-Nitroaniline	0.14	--	0.14	0.14
2-Nitrophenol	0.14	--	0.14	0.14
3- And 4- Methylphenol (Total)	0.11	--	0.11	0.11
3,3'-Dichlorobenzidine	0.46	--	0.46	0.46
3-Nitroaniline	0.12	--	0.12	0.12
4,6-Dinitro-2-Methylphenol	1.10	--	1.10	1.10
4-Bromophenyl Phenyl Ether	0.13	--	0.13	0.13
4-Chloro-3-Methylphenol	0.18	--	0.18	0.18
4-Chloroaniline	0.11	--	0.11	0.11
4-Chlorophenyl Phenyl Ether	0.12	--	0.12	0.12
4-Nitroaniline	0.16	--	0.16	0.16
4-Nitrophenol	1.95	--	1.95	1.95
Acetophenone	0.090	44.4%	0.050	0.13
Atrazine	0.18	--	0.18	0.18
Benzaldehyde	0.31	--	0.31	0.31
Benzyl Butyl Phthalate	0.13	--	0.13	0.13
Biphenyl (Diphenyl)	0.35	49.7%	0.18	0.52
Bis(2-Chloroethoxy) Methane	0.13	--	0.13	0.13
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.095	--	0.095	0.095
Bis(2-Chloroisopropyl) Ether	0.17	--	0.17	0.17
Bis(2-Ethylhexyl) Phthalate	0.16	--	0.16	0.16
Caprolactam	0.30	--	0.30	0.30
Carbazole	11.0	30.5%	7.64	14.4
Dibenzofuran	0.59	33.5%	0.39	0.79
Diethyl Phthalate	0.12	--	0.12	0.12
Dimethyl Phthalate	0.12	--	0.12	0.12
Di-N-Butyl Phthalate	0.12	--	0.12	0.12
Di-N-Octylphthalate	0.21	--	0.21	0.21
Hexachlorobenzene	0.17	--	0.17	0.17
Hexachlorobutadiene	0.12	--	0.12	0.12
Hexachlorocyclopentadiene	0.26	--	0.26	0.26
Hexachloroethane	0.15	--	0.15	0.15
Isophorone	0.090	--	0.090	0.090
Nitrobenzene	0.13	--	0.13	0.13
N-Nitrosodi-N-Propylamine	0.14	--	0.14	0.14
N-Nitrosodiphenylamine	0.37	--	0.37	0.37
Pentachlorophenol	0.50	--	0.50	0.50
Phenol	0.14	--	0.14	0.14

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-034			
	0.50-2.00			
	CFISS-034-SO-0.5-2			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	20,300	4.58%	19,371	21,229
Antimony	0.22	70.4%	0.065	0.37
Arsenic	5.30	7.46%	4.90	5.70
Barium	121	9.24%	110	132
Beryllium	0.82	4.90%	0.78	0.86
Cadmium	0.12	6.03%	0.11	0.13
Chromium, Total	16.7	7.75%	15.4	18.0
Chromium, Hexavalent	0.45	7.75%	0.41	0.48
Chromium, Trivalent	16.3	7.75%	15.0	17.5
Cobalt	5.70	1.99%	5.59	5.81
Copper	16.9	4.63%	16.1	17.7
Iron	15,200	2.40%	14,835	15,565
Lead	11.3	3.33%	10.9	11.7
Manganese	363	7.15%	337	389
Mercury	0.008	27.4%	0.006	0.010
Nickel	17.5	6.58%	16.3	18.7
Selenium	1.60	19.1%	1.29	1.91
Silver	0.038	9.83%	0.034	0.042
Thallium	0.11	6.56%	0.10	0.12
Vanadium	15.1	3.31%	14.6	15.6
Zinc	44.8	5.42%	42.4	47.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.68	32.7%	0.46	0.90
Fluoride	709	28.8%	505	913
Essential Nutrients (mg/kg)				
Calcium	23,400	15.1%	19,857	26,943
Magnesium	11,300	2.18%	11,054	11,546
Potassium	1,880	6.91%	1,750	2,010
Sodium	3,350	21.1%	2,644	4,056
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-034			
	0.50-2.00			
	CFISS-034-SO-0.5-2			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.009	47.7%	0.004	0.013
Acenaphthene	0.043	80.9%	0.008	0.078
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.12	82.4%	0.021	0.22
Fluoranthene	0.91	71.4%	0.26	1.56
Fluorene	0.035	74.2%	0.009	0.061
Naphthalene	0.016	28.9%	0.011	0.021
Phenanthrene	0.61	78.1%	0.13	1.09
Total LMW PAHs - 1/2MDL	1.75	74.3%	0.45	3.04
Total LMW PAHs - MDL	1.75	74.3%	0.45	3.05
Total LMW PAHs - Zero	1.74	74.3%	0.45	3.04
Benzo(A)Pyrene	0.89	67.2%	0.29	1.49
Benzo(A)Anthracene	0.71	68.8%	0.22	1.20
Benzo(B)Fluoranthene	1.10	60.1%	0.44	1.76
Benzo(G,H,I)Perylene	0.83	60.8%	0.33	1.33
Benzo(K)Fluoranthene	0.42	64.5%	0.15	0.69
Chrysene	0.91	62.9%	0.34	1.48
Dibenz(A,H)Anthracene	0.23	63.9%	0.083	0.38
Indeno(1,2,3-C,D)Pyrene	0.83	62.0%	0.32	1.34
Pyrene	1.30	72.7%	0.35	2.25
Total HMW PAHs - 1/2MDL	7.22	64.7%	2.55	11.9
Total HMW PAHs - MDL	7.22	64.7%	2.55	11.9
Total HMW PAHs - Zero	7.22	64.7%	2.55	11.9
Total PAHs - 1/2MDL	7.86	68.3%	2.49	13.2
Total PAHs - MDL	7.86	68.3%	2.49	13.2
Total PAHs - Zero	7.85	68.3%	2.49	13.2
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-034			
	0.50-2.00			
	CFISS-034-SO-0.5-2			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.091	76.1%	0.022	0.16
Dibenzofuran	0.018	70.0%	0.005	0.031
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.025	--	0.025	0.025
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.003	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-035			
	0.00-0.50			
	CFISS-035-SO-0-0.5			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	20,100	4.68%	19,159	21,041
Antimony	0.16	28.1%	0.12	0.20
Arsenic	4.80	13.8%	4.14	5.46
Barium	194	4.03%	186	202
Beryllium	0.87	6.32%	0.82	0.92
Cadmium	0.26	15.0%	0.22	0.30
Chromium, Total	14.5	10.6%	13.0	16.0
Chromium, Hexavalent	0.39	10.6%	0.35	0.43
Chromium, Trivalent	14.1	10.6%	12.6	15.6
Cobalt	6.00	3.51%	5.79	6.21
Copper	22.3	12.3%	19.6	25.0
Iron	15,900	3.40%	15,360	16,440
Lead	15.8	48.5%	8.13	23.5
Manganese	403	5.63%	380	426
Mercury	0.026	54.9%	0.012	0.040
Nickel	18.1	14.5%	15.5	20.7
Selenium	1.80	20.0%	1.44	2.16
Silver	0.054	9.03%	0.049	0.059
Thallium	0.11	14.4%	0.094	0.13
Vanadium	13.5	9.21%	12.3	14.7
Zinc	63.0	12.7%	55.0	71.0
Other Inorganic Parameters (mg/kg)				
Cyanide	0.49	40.2%	0.29	0.69
Fluoride	92.8	20.5%	73.7	112
Essential Nutrients (mg/kg)				
Calcium	15,000	10.7%	13,400	16,600
Magnesium	10,400	2.82%	10,107	10,693
Potassium	1,220	6.24%	1,144	1,296
Sodium	166	30.7%	115	217
Pesticides (mg/kg)				
Aldrin	3.90E-04	--	3.90E-04	3.90E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.50E-04	--	4.50E-04	4.50E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.55E-04	--	3.55E-04	3.55E-04
Dieldrin	4.20E-04	--	4.20E-04	4.20E-04
Endosulfan Sulfate	3.75E-04	--	3.75E-04	3.75E-04
Endrin	4.10E-04	--	4.10E-04	4.10E-04
Endrin Aldehyde	4.00E-04	--	4.00E-04	4.00E-04
Endrin Ketone	4.50E-04	--	4.50E-04	4.50E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.15E-04	--	4.15E-04	4.15E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.25E-04	--	4.25E-04	4.25E-04
P,P'-DDE	4.70E-04	--	4.70E-04	4.70E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-035			
	0.00-0.50			
	CFISS-035-SO-0-0.5			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	140%	-1.76E-03	0.011
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	140%	-1.76E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.019	47.1%	0.010	0.027
Acenaphthene	0.70	42.0%	0.41	0.99
Acenaphthylene	0.022	36.1%	0.014	0.029
Anthracene	3.90	37.7%	2.43	5.37
Fluoranthene	22.0	37.3%	13.8	30.2
Fluorene	0.29	34.6%	0.19	0.39
Naphthalene	0.021	44.9%	0.012	0.030
Phenanthrene	8.80	31.0%	6.07	11.5
Total LMW PAHs - 1/2MDL	35.8	35.8%	22.9	48.6
Total LMW PAHs - MDL	35.8	35.8%	23.0	48.6
Total LMW PAHs - Zero	35.7	35.9%	22.9	48.5
Benzo(A)Pyrene	21.0	36.1%	13.4	28.6
Benzo(A)Anthracene	18.0	32.0%	12.2	23.8
Benzo(B)Fluoranthene	23.0	29.8%	16.1	29.9
Benzo(G,H,I)Perylene	18.0	30.8%	12.5	23.5
Benzo(K)Fluoranthene	8.90	31.3%	6.12	11.7
Chrysene	18.0	35.9%	11.5	24.5
Dibenz(A,H)Anthracene	4.90	39.8%	2.95	6.85
Indeno(1,2,3-C,D)Pyrene	19.0	31.1%	13.1	24.9
Pyrene	21.0	39.3%	12.7	29.3
Total HMW PAHs - 1/2MDL	152	26.8%	111	192
Total HMW PAHs - MDL	152	26.8%	111	192
Total HMW PAHs - Zero	152	26.8%	111	192
Total PAHs - 1/2MDL	165	29.6%	116	213
Total PAHs - MDL	165	29.5%	116	213
Total PAHs - Zero	164	29.6%	116	213
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.060	--	0.060	0.060
1,4-Dioxane (P-Dioxane)	0.23	--	0.23	0.23
2,3,4,6-Tetrachlorophenol	0.080	--	0.080	0.080
2,4,5-Trichlorophenol	0.085	--	0.085	0.085
2,4,6-Trichlorophenol	0.024	--	0.024	0.024
2,4-Dichlorophenol	0.020	--	0.020	0.020
2,4-Dimethylphenol	0.19	--	0.19	0.19

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-035			
	0.00-0.50			
	CFISS-035-SO-0-0.5			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.65	--	0.65	0.65
2,4-Dinitrotoluene	0.033	--	0.033	0.033
2,6-Dinitrotoluene	0.045	--	0.045	0.045
2-Chloronaphthalene	0.019	--	0.019	0.019
2-Chlorophenol	0.021	--	0.021	0.021
2-Methylphenol (O-Cresol)	0.037	--	0.037	0.037
2-Nitroaniline	0.028	--	0.028	0.028
2-Nitrophenol	0.028	--	0.028	0.028
3- And 4- Methylphenol (Total)	0.022	--	0.022	0.022
3,3'-Dichlorobenzidine	0.095	--	0.095	0.095
3-Nitroaniline	0.025	--	0.025	0.025
4,6-Dinitro-2-Methylphenol	0.23	--	0.23	0.23
4-Bromophenyl Phenyl Ether	0.027	--	0.027	0.027
4-Chloro-3-Methylphenol	0.036	--	0.036	0.036
4-Chloroaniline	0.022	--	0.022	0.022
4-Chlorophenyl Phenyl Ether	0.025	--	0.025	0.025
4-Nitroaniline	0.032	--	0.032	0.032
4-Nitrophenol	0.40	--	0.40	0.40
Acetophenone	0.018	44.4%	0.010	0.026
Atrazine	0.037	--	0.037	0.037
Benzaldehyde	0.065	--	0.065	0.065
Benzyl Butyl Phthalate	0.026	--	0.026	0.026
Biphenyl (Diphenyl)	0.070	49.7%	0.035	0.10
Bis(2-Chloroethoxy) Methane	0.026	--	0.026	0.026
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.020	--	0.020	0.020
Bis(2-Chloroisopropyl) Ether	0.035	--	0.035	0.035
Bis(2-Ethylhexyl) Phthalate	0.033	--	0.033	0.033
Caprolactam	0.060	--	0.060	0.060
Carbazole	1.90	30.5%	1.32	2.48
Dibenzofuran	0.10	33.5%	0.066	0.13
Diethyl Phthalate	0.024	--	0.024	0.024
Dimethyl Phthalate	0.024	--	0.024	0.024
Di-N-Butyl Phthalate	0.025	--	0.025	0.025
Di-N-Octylphthalate	0.043	--	0.043	0.043
Hexachlorobenzene	0.034	--	0.034	0.034
Hexachlorobutadiene	0.024	--	0.024	0.024
Hexachlorocyclopentadiene	0.050	--	0.050	0.050
Hexachloroethane	0.031	--	0.031	0.031
Isophorone	0.018	--	0.018	0.018
Nitrobenzene	0.027	--	0.027	0.027
N-Nitrosodi-N-Propylamine	0.028	--	0.028	0.028
N-Nitrosodiphenylamine	0.075	--	0.075	0.075
Pentachlorophenol	0.10	--	0.10	0.10
Phenol	0.028	--	0.028	0.028

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-035			
	0.50-2.00			
	CFISS-035-SO-0.5-2			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,800	4.58%	15,077	16,523
Antimony	0.15	70.4%	0.044	0.26
Arsenic	5.60	7.46%	5.18	6.02
Barium	123	9.24%	112	134
Beryllium	0.75	4.90%	0.71	0.79
Cadmium	0.10	6.03%	0.094	0.11
Chromium, Total	14.9	7.75%	13.7	16.1
Chromium, Hexavalent	0.40	7.75%	0.37	0.43
Chromium, Trivalent	14.5	7.75%	13.4	15.6
Cobalt	6.10	1.99%	5.98	6.22
Copper	16.9	4.63%	16.1	17.7
Iron	15,700	2.40%	15,323	16,077
Lead	10.3	3.33%	9.96	10.6
Manganese	415	7.15%	385	445
Mercury	0.058	27.4%	0.042	0.074
Nickel	14.9	6.58%	13.9	15.9
Selenium	1.90	19.1%	1.54	2.26
Silver	0.037	9.83%	0.033	0.041
Thallium	0.094	6.56%	0.088	0.10
Vanadium	13.6	3.31%	13.1	14.1
Zinc	47.6	5.42%	45.0	50.2
Other Inorganic Parameters (mg/kg)				
Cyanide	0.51	32.7%	0.34	0.68
Fluoride	232	28.8%	165	299
Essential Nutrients (mg/kg)				
Calcium	23,700	15.1%	20,112	27,288
Magnesium	11,700	2.18%	11,445	11,955
Potassium	1,260	6.91%	1,173	1,347
Sodium	471	21.1%	372	570
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-035			
	0.50-2.00			
	CFISS-035-SO-0.5-2			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.7%	0.002	0.005
Acenaphthene	0.018	80.9%	0.003	0.033
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.051	82.4%	0.009	0.093
Fluoranthene	0.41	71.4%	0.12	0.70
Fluorene	0.010	74.2%	0.002	0.017
Naphthalene	0.004	28.9%	0.003	0.005
Phenanthrene	0.22	78.1%	0.048	0.39
Total LMW PAHs - 1/2MDL	0.72	74.3%	0.19	1.26
Total LMW PAHs - MDL	0.73	74.3%	0.19	1.28
Total LMW PAHs - Zero	0.71	74.3%	0.18	1.23
Benzo(A)Pyrene	0.40	67.2%	0.13	0.67
Benzo(A)Anthracene	0.32	68.8%	0.100	0.54
Benzo(B)Fluoranthene	0.48	60.1%	0.19	0.77
Benzo(G,H,I)Perylene	0.35	60.8%	0.14	0.56
Benzo(K)Fluoranthene	0.23	64.5%	0.082	0.38
Chrysene	0.37	62.9%	0.14	0.60
Dibenz(A,H)Anthracene	0.096	63.9%	0.035	0.16
Indeno(1,2,3-C,D)Pyrene	0.33	62.0%	0.13	0.53
Pyrene	0.54	72.7%	0.15	0.93
Total HMW PAHs - 1/2MDL	3.12	64.7%	1.10	5.13
Total HMW PAHs - MDL	3.12	64.7%	1.10	5.13
Total HMW PAHs - Zero	3.12	64.7%	1.10	5.13
Total PAHs - 1/2MDL	3.35	68.3%	1.06	5.64
Total PAHs - MDL	3.36	68.3%	1.06	5.66
Total PAHs - Zero	3.34	68.3%	1.06	5.63
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-035			
	0.50-2.00			
	CFISS-035-SO-0.5-2			
	7/11/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.037	76.1%	0.009	0.065
Dibenzofuran	0.005	70.0%	0.001	0.009
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.021	--	0.021	0.021
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-036			
	0.00-0.50			
	CFISS-036-SO-0-0.5			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,100	4.68%	14,393	15,807
Antimony	0.24	28.1%	0.17	0.31
Arsenic	5.30	13.8%	4.57	6.03
Barium	156	4.03%	150	162
Beryllium	0.48	6.32%	0.45	0.51
Cadmium	0.26	15.0%	0.22	0.30
Chromium, Total	15.6	10.6%	14.0	17.2
Chromium, Hexavalent	0.42	10.6%	0.37	0.46
Chromium, Trivalent	15.2	10.6%	13.6	16.8
Cobalt	6.80	3.51%	6.56	7.04
Copper	26.1	12.3%	22.9	29.3
Iron	17,500	3.40%	16,905	18,095
Lead	19.8	48.5%	10.2	29.4
Manganese	558	5.63%	527	589
Mercury	0.008	54.9%	0.004	0.012
Nickel	19.9	14.5%	17.0	22.8
Selenium	1.10	20.0%	0.88	1.32
Silver	0.066	9.03%	0.060	0.072
Thallium	0.099	14.4%	0.085	0.11
Vanadium	13.4	9.21%	12.2	14.6
Zinc	76.8	12.7%	67.0	86.6
Other Inorganic Parameters (mg/kg)				
Cyanide	0.13	40.2%	0.078	0.18
Fluoride	56.3	20.5%	44.7	67.9
Essential Nutrients (mg/kg)				
Calcium	16,200	10.7%	14,472	17,928
Magnesium	8,140	2.82%	7,910	8,370
Potassium	873	6.24%	819	927
Sodium	92.2	30.7%	63.9	121
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-036			
	0.00-0.50			
	CFISS-036-SO-0-0.5			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.090	47.1%	0.048	0.13
Acenaphthene	0.26	42.0%	0.15	0.37
Acenaphthylene	0.010	36.1%	0.006	0.014
Anthracene	0.41	37.7%	0.26	0.56
Fluoranthene	2.20	37.3%	1.38	3.02
Fluorene	0.26	34.6%	0.17	0.35
Naphthalene	0.31	44.9%	0.17	0.45
Phenanthrene	1.70	31.0%	1.17	2.23
Total LMW PAHs - 1/2MDL	5.24	35.8%	3.36	7.12
Total LMW PAHs - MDL	5.24	35.8%	3.37	7.11
Total LMW PAHs - Zero	5.24	35.9%	3.36	7.12
Benzo(A)Pyrene	1.10	36.1%	0.70	1.50
Benzo(A)Anthracene	0.95	32.0%	0.65	1.25
Benzo(B)Fluoranthene	1.80	29.8%	1.26	2.34
Benzo(G,H,I)Perylene	0.78	30.8%	0.54	1.02
Benzo(K)Fluoranthene	0.68	31.3%	0.47	0.89
Chrysene	1.60	35.9%	1.03	2.17
Dibenz(A,H)Anthracene	0.24	39.8%	0.14	0.34
Indeno(1,2,3-C,D)Pyrene	0.86	31.1%	0.59	1.13
Pyrene	1.40	39.3%	0.85	1.95
Total HMW PAHs - 1/2MDL	9.41	26.8%	6.89	11.9
Total HMW PAHs - MDL	9.41	26.8%	6.89	11.9
Total HMW PAHs - Zero	9.41	26.8%	6.89	11.9
Total PAHs - 1/2MDL	12.8	29.6%	8.99	16.5
Total PAHs - MDL	12.8	29.5%	8.99	16.5
Total PAHs - Zero	12.8	29.6%	8.99	16.5
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-036			
	0.00-0.50			
	CFISS-036-SO-0-0.5			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.015	49.7%	0.007	0.022
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.21	30.5%	0.15	0.27
Dibenzofuran	0.15	33.5%	0.100	0.20
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.10	--	0.10	0.10
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-036			
	0.50-2.00			
	CFISS-036-SO-0.5-2			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	23,100	4.58%	22,043	24,157
Antimony	0.18	70.4%	0.053	0.31
Arsenic	4.70	7.46%	4.35	5.05
Barium	302	9.24%	274	330
Beryllium	0.65	4.90%	0.62	0.68
Cadmium	0.18	6.03%	0.17	0.19
Chromium, Total	13.9	7.75%	12.8	15.0
Chromium, Hexavalent	0.37	7.75%	0.34	0.40
Chromium, Trivalent	13.5	7.75%	12.5	14.6
Cobalt	6.70	1.99%	6.57	6.83
Copper	17.7	4.63%	16.9	18.5
Iron	17,600	2.40%	17,177	18,023
Lead	12.4	3.33%	12.0	12.8
Manganese	686	7.15%	637	735
Mercury	0.008	27.4%	0.005	0.010
Nickel	14.2	6.58%	13.3	15.1
Selenium	1.10	19.1%	0.89	1.31
Silver	0.042	9.83%	0.038	0.046
Thallium	0.14	6.56%	0.13	0.15
Vanadium	17.2	3.31%	16.6	17.8
Zinc	65.0	5.42%	61.5	68.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.11	32.7%	0.074	0.15
Fluoride	87.3	28.8%	62.2	112
Essential Nutrients (mg/kg)				
Calcium	7,350	15.1%	6,237	8,463
Magnesium	6,830	2.18%	6,681	6,979
Potassium	1,010	6.91%	940	1,080
Sodium	106	21.1%	83.7	128
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-036			
	0.50-2.00			
	CFISS-036-SO-0.5-2			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.004	47.7%	0.002	0.006
Acenaphthene	0.025	80.9%	0.005	0.045
Acenaphthylene	0.005	62.8%	0.002	0.007
Anthracene	0.036	82.4%	0.006	0.066
Fluoranthene	0.21	71.4%	0.060	0.36
Fluorene	0.022	74.2%	0.006	0.038
Naphthalene	0.010	28.9%	0.007	0.012
Phenanthrene	0.15	78.1%	0.033	0.27
Total LMW PAHs - 1/2MDL	0.46	74.3%	0.12	0.80
Total LMW PAHs - MDL	0.47	74.3%	0.12	0.82
Total LMW PAHs - Zero	0.45	74.3%	0.12	0.79
Benzo(A)Pyrene	0.12	67.2%	0.039	0.20
Benzo(A)Anthracene	0.12	68.8%	0.037	0.20
Benzo(B)Fluoranthene	0.17	60.1%	0.068	0.27
Benzo(G,H,I)Perylene	0.082	60.8%	0.032	0.13
Benzo(K)Fluoranthene	0.057	64.5%	0.020	0.094
Chrysene	0.13	62.9%	0.048	0.21
Dibenz(A,H)Anthracene	0.028	63.9%	0.010	0.046
Indeno(1,2,3-C,D)Pyrene	0.096	62.0%	0.036	0.16
Pyrene	0.25	72.7%	0.068	0.43
Total HMW PAHs - 1/2MDL	1.05	64.7%	0.37	1.73
Total HMW PAHs - MDL	1.05	64.7%	0.37	1.73
Total HMW PAHs - Zero	1.05	64.7%	0.37	1.73
Total PAHs - 1/2MDL	1.34	68.3%	0.42	2.26
Total PAHs - MDL	1.34	68.3%	0.43	2.26
Total PAHs - Zero	1.34	68.3%	0.42	2.25
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.014	--	0.014	0.014
1,4-Dioxane (P-Dioxane)	0.048	--	0.048	0.048
2,3,4,6-Tetrachlorophenol	0.017	--	0.017	0.017
2,4,5-Trichlorophenol	0.018	--	0.018	0.018
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.040	--	0.040	0.040

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-036			
	0.50-2.00			
	CFISS-036-SO-0.5-2			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.14	--	0.14	0.14
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.010	--	0.010	0.010
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.005	--	0.005	0.005
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.005	--	0.005	0.005
3,3'-Dichlorobenzidine	0.020	--	0.020	0.020
3-Nitroaniline	0.006	--	0.006	0.006
4,6-Dinitro-2-Methylphenol	0.048	--	0.048	0.048
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.008	--	0.008	0.008
4-Chloroaniline	0.005	--	0.005	0.005
4-Chlorophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.085	--	0.085	0.085
Acetophenone	0.004	41.1%	0.002	0.006
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.014	--	0.014	0.014
Benzyl Butyl Phthalate	0.006	32.7%	0.004	0.007
Biphenyl (Diphenyl)	0.015	98.2%	2.70E-04	0.030
Bis(2-Chloroethoxy) Methane	0.006	--	0.006	0.006
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.008	--	0.008	0.008
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.013	--	0.013	0.013
Carbazole	0.016	76.1%	0.004	0.028
Dibenzofuran	0.006	70.0%	0.002	0.009
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.006	--	0.006	0.006
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.007	--	0.007	0.007
Isophorone	0.004	32.5%	0.003	0.005
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.016	--	0.016	0.016
Pentachlorophenol	0.022	--	0.022	0.022
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-037			
	0.00-0.50			
	CFISS-037-SO-0-0.5			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,200	4.68%	16,395	18,005
Antimony	4.40	28.1%	3.16	5.64
Arsenic	19.6	13.8%	16.9	22.3
Barium	190	4.03%	182	198
Beryllium	0.61	6.32%	0.57	0.65
Cadmium	0.68	15.0%	0.58	0.78
Chromium, Total	35.9	10.6%	32.1	39.7
Chromium, Hexavalent	0.96	10.6%	0.86	1.06
Chromium, Trivalent	34.9	10.6%	31.2	38.6
Cobalt	10.5	3.51%	10.1	10.9
Copper	477	12.3%	418	536
Iron	40,700	3.40%	39,316	42,084
Lead	88.3	48.5%	45.5	131
Manganese	634	5.63%	598	670
Mercury	0.034	54.9%	0.015	0.053
Nickel	46.4	14.5%	39.7	53.1
Selenium	1.20	20.0%	0.96	1.44
Silver	0.69	9.03%	0.63	0.75
Thallium	0.17	14.4%	0.15	0.19
Vanadium	27.6	9.21%	25.1	30.1
Zinc	888	12.7%	775	1,001
Other Inorganic Parameters (mg/kg)				
Cyanide	0.45	40.2%	0.27	0.63
Fluoride	83.4	20.5%	66.3	101
Essential Nutrients (mg/kg)				
Calcium	32,500	10.7%	29,033	35,967
Magnesium	9,120	2.82%	8,863	9,377
Potassium	1,430	6.24%	1,341	1,519
Sodium	364	30.7%	252	476
Pesticides (mg/kg)				
Aldrin	3.90E-04	--	3.90E-04	3.90E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	2.95E-04	--	2.95E-04	2.95E-04
Alpha Endosulfan	4.50E-04	--	4.50E-04	4.50E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.15E-04	--	3.15E-04	3.15E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.50E-04	--	3.50E-04	3.50E-04
Dieldrin	4.20E-04	--	4.20E-04	4.20E-04
Endosulfan Sulfate	3.75E-04	--	3.75E-04	3.75E-04
Endrin	4.10E-04	--	4.10E-04	4.10E-04
Endrin Aldehyde	4.00E-04	--	4.00E-04	4.00E-04
Endrin Ketone	4.50E-04	--	4.50E-04	4.50E-04
Gamma Bhc (Lindane)	2.90E-04	--	2.90E-04	2.90E-04
Heptachlor	4.15E-04	--	4.15E-04	4.15E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.25E-04	--	4.25E-04	4.25E-04
P,P'-DDE	4.70E-04	--	4.70E-04	4.70E-04
P,P'-DDT	3.35E-04	--	3.35E-04	3.35E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-037			
	0.00-0.50			
	CFISS-037-SO-0-0.5			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.004	140%	-1.76E-03	0.011
PCB-1260 (Aroclor 1260)	0.004	--	0.004	0.004
PCB-1262 (Aroclor 1262)	0.004	--	0.004	0.004
PCB-1268 (Aroclor 1268)	0.004	--	0.004	0.004
Polychlorinated Biphenyl (PCBs)	0.004	140%	-1.76E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.078	47.1%	0.041	0.11
Acenaphthene	0.37	42.0%	0.21	0.53
Acenaphthylene	0.011	36.1%	0.007	0.015
Anthracene	0.54	37.7%	0.34	0.74
Fluoranthene	7.40	37.3%	4.64	10.2
Fluorene	0.16	34.6%	0.10	0.22
Naphthalene	0.098	44.9%	0.054	0.14
Phenanthrene	3.70	31.0%	2.55	4.85
Total LMW PAHs - 1/2MDL	12.4	35.8%	7.93	16.8
Total LMW PAHs - MDL	12.4	35.8%	7.94	16.8
Total LMW PAHs - Zero	12.4	35.9%	7.92	16.8
Benzo(A)Pyrene	4.50	36.1%	2.87	6.13
Benzo(A)Anthracene	4.10	32.0%	2.79	5.41
Benzo(B)Fluoranthene	7.20	29.8%	5.05	9.35
Benzo(G,H,I)Perylene	3.40	30.8%	2.35	4.45
Benzo(K)Fluoranthene	2.50	31.3%	1.72	3.28
Chrysene	5.90	35.9%	3.78	8.02
Dibenz(A,H)Anthracene	1.00	39.8%	0.60	1.40
Indeno(1,2,3-C,D)Pyrene	3.70	31.1%	2.55	4.85
Pyrene	5.70	39.3%	3.46	7.94
Total HMW PAHs - 1/2MDL	38.0	26.8%	27.8	48.2
Total HMW PAHs - MDL	38.0	26.8%	27.8	48.2
Total HMW PAHs - Zero	38.0	26.8%	27.8	48.2
Total PAHs - 1/2MDL	43.1	29.6%	30.3	55.8
Total PAHs - MDL	43.1	29.5%	30.4	55.8
Total PAHs - Zero	43.1	29.6%	30.3	55.8
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-037			
	0.00-0.50			
	CFISS-037-SO-0-0.5			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.019	--	0.019	0.019
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.059	--	0.059	0.059
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.60	30.5%	0.42	0.78
Dibenzofuran	0.13	33.5%	0.086	0.17
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.034	--	0.034	0.034
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.016	--	0.016	0.016

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-037			
	0.50-2.00			
	CFISS-037-SO-0.5-2			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	18,400	4.58%	17,558	19,242
Antimony	0.87	70.4%	0.26	1.48
Arsenic	8.20	7.46%	7.59	8.81
Barium	230	9.24%	209	251
Beryllium	0.64	4.90%	0.61	0.67
Cadmium	0.23	6.03%	0.22	0.24
Chromium, Total	23.0	7.75%	21.2	24.8
Chromium, Hexavalent	0.62	7.75%	0.57	0.66
Chromium, Trivalent	22.4	7.75%	20.6	24.1
Cobalt	6.80	1.99%	6.66	6.94
Copper	73.1	4.63%	69.7	76.5
Iron	20,200	2.40%	19,715	20,685
Lead	23.2	3.33%	22.4	24.0
Manganese	564	7.15%	524	604
Mercury	0.019	27.4%	0.014	0.024
Nickel	20.1	6.58%	18.8	21.4
Selenium	1.10	19.1%	0.89	1.31
Silver	0.17	9.83%	0.15	0.19
Thallium	0.12	6.56%	0.11	0.13
Vanadium	17.1	3.31%	16.5	17.7
Zinc	204	5.42%	193	215
Other Inorganic Parameters (mg/kg)				
Cyanide	0.35	32.7%	0.24	0.46
Fluoride	87.3	28.8%	62.2	112
Essential Nutrients (mg/kg)				
Calcium	11,500	15.1%	9,759	13,241
Magnesium	8,190	2.18%	8,011	8,369
Potassium	1,100	6.91%	1,024	1,176
Sodium	226	21.1%	178	274
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-037			
	0.50-2.00			
	CFISS-037-SO-0.5-2			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.011	47.7%	0.006	0.016
Acenaphthene	0.050	80.9%	0.010	0.090
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.093	82.4%	0.016	0.17
Fluoranthene	0.75	71.4%	0.21	1.29
Fluorene	0.039	74.2%	0.010	0.068
Naphthalene	0.015	28.9%	0.011	0.019
Phenanthrene	0.61	78.1%	0.13	1.09
Total LMW PAHs - 1/2MDL	1.57	74.3%	0.40	2.74
Total LMW PAHs - MDL	1.58	74.3%	0.41	2.75
Total LMW PAHs - Zero	1.57	74.3%	0.40	2.73
Benzo(A)Pyrene	0.39	67.2%	0.13	0.65
Benzo(A)Anthracene	0.35	68.8%	0.11	0.59
Benzo(B)Fluoranthene	0.57	60.1%	0.23	0.91
Benzo(G,H,I)Perylene	0.48	60.8%	0.19	0.77
Benzo(K)Fluoranthene	0.24	64.5%	0.085	0.39
Chrysene	0.53	62.9%	0.20	0.86
Dibenz(A,H)Anthracene	0.12	63.9%	0.043	0.20
Indeno(1,2,3-C,D)Pyrene	0.45	62.0%	0.17	0.73
Pyrene	0.93	72.7%	0.25	1.61
Total HMW PAHs - 1/2MDL	4.06	64.7%	1.43	6.69
Total HMW PAHs - MDL	4.06	64.7%	1.43	6.69
Total HMW PAHs - Zero	4.06	64.7%	1.43	6.69
Total PAHs - 1/2MDL	5.05	68.3%	1.60	8.50
Total PAHs - MDL	5.06	68.3%	1.60	8.51
Total PAHs - Zero	5.05	68.3%	1.60	8.50
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-037			
	0.50-2.00			
	CFISS-037-SO-0.5-2			
	7/15/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.019	32.7%	0.013	0.025
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.060	76.1%	0.014	0.11
Dibenzofuran	0.027	70.0%	0.008	0.046
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.011	--	0.011	0.011
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-038			
	0.00-0.50			
	CFISS-038-SO-0-0.5			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	26,800	4.68%	25,545	28,055
Antimony	8.60	28.1%	6.19	11.0
Arsenic	31.3	13.8%	27.0	35.6
Barium	221	4.03%	212	230
Beryllium	0.97	6.32%	0.91	1.03
Cadmium	0.82	15.0%	0.70	0.94
Chromium, Total	36.8	10.6%	32.9	40.7
Chromium, Hexavalent	0.98	10.6%	0.88	1.09
Chromium, Trivalent	35.8	10.6%	32.0	39.6
Cobalt	13.5	3.51%	13.0	14.0
Copper	887	12.3%	778	996
Iron	66,700	3.40%	64,433	68,967
Lead	144	48.5%	74.1	214
Manganese	731	5.63%	690	772
Mercury	0.008	54.9%	0.003	0.012
Nickel	51.6	14.5%	44.1	59.1
Selenium	1.10	20.0%	0.88	1.32
Silver	1.30	9.03%	1.18	1.42
Thallium	0.22	14.4%	0.19	0.25
Vanadium	38.6	9.21%	35.0	42.2
Zinc	1,720	12.7%	1,501	1,939
Other Inorganic Parameters (mg/kg)				
Cyanide	0.021	40.2%	0.013	0.029
Fluoride	507	20.5%	403	611
Essential Nutrients (mg/kg)				
Calcium	45,700	10.7%	40,825	50,575
Magnesium	8,830	2.82%	8,581	9,079
Potassium	2,110	6.24%	1,978	2,242
Sodium	1,970	30.7%	1,364	2,576
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-038			
	0.00-0.50			
	CFISS-038-SO-0-0.5			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.044	47.1%	0.023	0.065
Acenaphthene	0.26	42.0%	0.15	0.37
Acenaphthylene	0.033	36.1%	0.021	0.045
Anthracene	0.54	37.7%	0.34	0.74
Fluoranthene	6.30	37.3%	3.95	8.65
Fluorene	0.14	34.6%	0.091	0.19
Naphthalene	0.083	44.9%	0.046	0.12
Phenanthrene	3.00	31.0%	2.07	3.93
Total LMW PAHs - 1/2MDL	10.4	35.8%	6.67	14.1
Total LMW PAHs - MDL	10.4	35.8%	6.68	14.1
Total LMW PAHs - Zero	10.4	35.9%	6.67	14.1
Benzo(A)Pyrene	4.20	36.1%	2.68	5.72
Benzo(A)Anthracene	3.50	32.0%	2.38	4.62
Benzo(B)Fluoranthene	7.20	29.8%	5.05	9.35
Benzo(G,H,I)Perylene	5.70	30.8%	3.95	7.45
Benzo(K)Fluoranthene	2.60	31.3%	1.79	3.41
Chrysene	6.00	35.9%	3.85	8.15
Dibenz(A,H)Anthracene	1.30	39.8%	0.78	1.82
Indeno(1,2,3-C,D)Pyrene	5.70	31.1%	3.93	7.47
Pyrene	4.30	39.3%	2.61	5.99
Total HMW PAHs - 1/2MDL	40.5	26.8%	29.6	51.4
Total HMW PAHs - MDL	40.5	26.8%	29.6	51.4
Total HMW PAHs - Zero	40.5	26.8%	29.6	51.4
Total PAHs - 1/2MDL	43.7	29.6%	30.8	56.6
Total PAHs - MDL	43.7	29.5%	30.8	56.6
Total PAHs - Zero	43.7	29.6%	30.8	56.6
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-038			
	0.00-0.50			
	CFISS-038-SO-0-0.5			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.14	--	0.14	0.14
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.064	--	0.064	0.064
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.48	30.5%	0.33	0.63
Dibenzofuran	0.095	33.5%	0.063	0.13
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.045	--	0.045	0.045
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-038			
	0.50-2.00			
	CFISS-038-SO-0.5-2			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	14,900	4.58%	14,218	15,582
Antimony	0.48	70.4%	0.14	0.82
Arsenic	6.20	7.46%	5.74	6.66
Barium	158	9.24%	143	173
Beryllium	0.59	4.90%	0.56	0.62
Cadmium	0.30	6.03%	0.28	0.32
Chromium, Total	17.4	7.75%	16.1	18.7
Chromium, Hexavalent	0.47	7.75%	0.43	0.50
Chromium, Trivalent	16.9	7.75%	15.6	18.2
Cobalt	6.00	1.99%	5.88	6.12
Copper	47.7	4.63%	45.5	49.9
Iron	16,700	2.40%	16,299	17,101
Lead	29.3	3.33%	28.3	30.3
Manganese	474	7.15%	440	508
Mercury	0.008	27.4%	0.006	0.010
Nickel	18.4	6.58%	17.2	19.6
Selenium	1.10	19.1%	0.89	1.31
Silver	0.27	9.83%	0.24	0.30
Thallium	0.11	6.56%	0.10	0.12
Vanadium	12.7	3.31%	12.3	13.1
Zinc	123	5.42%	116	130
Other Inorganic Parameters (mg/kg)				
Cyanide	0.73	32.7%	0.49	0.97
Fluoride	207	28.8%	147	267
Essential Nutrients (mg/kg)				
Calcium	23,200	15.1%	19,687	26,713
Magnesium	9,630	2.18%	9,420	9,840
Potassium	1,040	6.91%	968	1,112
Sodium	352	21.1%	278	426
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-038			
	0.50-2.00			
	CFISS-038-SO-0.5-2			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.097	47.7%	0.051	0.14
Acenaphthene	0.40	80.9%	0.076	0.72
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.44	82.4%	0.078	0.80
Fluoranthene	3.70	71.4%	1.06	6.34
Fluorene	0.18	74.2%	0.047	0.31
Naphthalene	0.087	28.9%	0.062	0.11
Phenanthrene	2.70	78.1%	0.59	4.81
Total LMW PAHs - 1/2MDL	7.61	74.3%	1.96	13.3
Total LMW PAHs - MDL	7.61	74.3%	1.96	13.3
Total LMW PAHs - Zero	7.60	74.3%	1.96	13.3
Benzo(A)Pyrene	2.10	67.2%	0.69	3.51
Benzo(A)Anthracene	1.90	68.8%	0.59	3.21
Benzo(B)Fluoranthene	2.70	60.1%	1.08	4.32
Benzo(G,H,I)Perylene	2.80	60.8%	1.10	4.50
Benzo(K)Fluoranthene	1.10	64.5%	0.39	1.81
Chrysene	2.50	62.9%	0.93	4.07
Dibenz(A,H)Anthracene	0.58	63.9%	0.21	0.95
Indeno(1,2,3-C,D)Pyrene	2.60	62.0%	0.99	4.21
Pyrene	3.70	72.7%	1.01	6.39
Total HMW PAHs - 1/2MDL	20.0	64.7%	7.05	32.9
Total HMW PAHs - MDL	20.0	64.7%	7.05	32.9
Total HMW PAHs - Zero	20.0	64.7%	7.05	32.9
Total PAHs - 1/2MDL	24.8	68.3%	7.85	41.7
Total PAHs - MDL	24.8	68.3%	7.85	41.7
Total PAHs - Zero	24.8	68.3%	7.85	41.7
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.045	--	0.045	0.045
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-038			
	0.50-2.00			
	CFISS-038-SO-0.5-2			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.017	--	0.017	0.017
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.29	76.1%	0.069	0.51
Dibenzofuran	0.11	70.0%	0.033	0.19
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.027	--	0.027	0.027

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-039			
	0.00-0.50			
	CFISS-039-SO-0-0.5			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	14,900	4.68%	14,202	15,598
Antimony	0.11	28.1%	0.079	0.14
Arsenic	4.50	13.8%	3.88	5.12
Barium	158	4.03%	152	164
Beryllium	0.60	6.32%	0.56	0.64
Cadmium	0.082	15.0%	0.070	0.094
Chromium, Total	12.9	10.6%	11.5	14.3
Chromium, Hexavalent	0.35	10.6%	0.31	0.38
Chromium, Trivalent	12.6	10.6%	11.2	13.9
Cobalt	6.30	3.51%	6.08	6.52
Copper	15.8	12.3%	13.9	17.7
Iron	16,100	3.40%	15,553	16,647
Lead	12.0	48.5%	6.18	17.8
Manganese	480	5.63%	453	507
Mercury	0.013	54.9%	0.006	0.020
Nickel	13.4	14.5%	11.5	15.3
Selenium	1.10	20.0%	0.88	1.32
Silver	0.036	9.03%	0.033	0.039
Thallium	0.087	14.4%	0.075	0.099
Vanadium	12.3	9.21%	11.2	13.4
Zinc	48.2	12.7%	42.1	54.3
Other Inorganic Parameters (mg/kg)				
Cyanide	0.048	40.2%	0.029	0.067
Fluoride	60.9	20.5%	48.4	73.4
Essential Nutrients (mg/kg)				
Calcium	13,200	10.7%	11,792	14,608
Magnesium	8,960	2.82%	8,707	9,213
Potassium	875	6.24%	820	930
Sodium	143	30.7%	99.0	187
Pesticides (mg/kg)				
Aldrin	4.05E-04	--	4.05E-04	4.05E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.65E-04	--	4.65E-04	4.65E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.35E-04	--	4.35E-04	4.35E-04
Endosulfan Sulfate	3.90E-04	--	3.90E-04	3.90E-04
Endrin	4.25E-04	--	4.25E-04	4.25E-04
Endrin Aldehyde	4.15E-04	--	4.15E-04	4.15E-04
Endrin Ketone	4.65E-04	--	4.65E-04	4.65E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.30E-04	--	4.30E-04	4.30E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.40E-04	--	4.40E-04	4.40E-04
P,P'-DDE	4.85E-04	--	4.85E-04	4.85E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-039			
	0.00-0.50			
	CFISS-039-SO-0-0.5			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.82E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.82E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.009	47.1%	0.005	0.014
Acenaphthene	0.036	42.0%	0.021	0.051
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.058	37.7%	0.036	0.080
Fluoranthene	0.46	37.3%	0.29	0.63
Fluorene	0.024	34.6%	0.016	0.032
Naphthalene	0.013	44.9%	0.007	0.019
Phenanthrene	0.30	31.0%	0.21	0.39
Total LMW PAHs - 1/2MDL	0.90	35.8%	0.58	1.23
Total LMW PAHs - MDL	0.91	35.8%	0.58	1.23
Total LMW PAHs - Zero	0.90	35.9%	0.58	1.22
Benzo(A)Pyrene	0.34	36.1%	0.22	0.46
Benzo(A)Anthracene	0.26	32.0%	0.18	0.34
Benzo(B)Fluoranthene	0.42	29.8%	0.29	0.55
Benzo(G,H,I)Perylene	0.42	30.8%	0.29	0.55
Benzo(K)Fluoranthene	0.16	31.3%	0.11	0.21
Chrysene	0.36	35.9%	0.23	0.49
Dibenz(A,H)Anthracene	0.095	39.8%	0.057	0.13
Indeno(1,2,3-C,D)Pyrene	0.38	31.1%	0.26	0.50
Pyrene	0.44	39.3%	0.27	0.61
Total HMW PAHs - 1/2MDL	2.88	26.8%	2.10	3.65
Total HMW PAHs - MDL	2.88	26.8%	2.10	3.65
Total HMW PAHs - Zero	2.88	26.8%	2.10	3.65
Total PAHs - 1/2MDL	3.35	29.6%	2.36	4.34
Total PAHs - MDL	3.35	29.5%	2.36	4.35
Total PAHs - Zero	3.35	29.6%	2.36	4.34
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-039			
	0.00-0.50			
	CFISS-039-SO-0-0.5			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	--	0.005	0.005
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.037	30.5%	0.026	0.048
Dibenzofuran	0.013	33.5%	0.009	0.017
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	--	0.004	0.004
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-039			
	0.50-2.00			
	CFISS-039-SO-0.5-2			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	23,000	4.58%	21,948	24,052
Antimony	0.82	70.4%	0.24	1.40
Arsenic	6.20	7.46%	5.74	6.66
Barium	116	9.24%	105	127
Beryllium	0.79	4.90%	0.75	0.83
Cadmium	0.46	6.03%	0.43	0.49
Chromium, Total	20.5	7.75%	18.9	22.1
Chromium, Hexavalent	0.55	7.75%	0.51	0.59
Chromium, Trivalent	20.0	7.75%	18.4	21.5
Cobalt	6.20	1.99%	6.08	6.32
Copper	42.9	4.63%	40.9	44.9
Iron	17,400	2.40%	16,982	17,818
Lead	52.6	3.33%	50.8	54.4
Manganese	364	7.15%	338	390
Mercury	0.009	27.4%	0.006	0.011
Nickel	35.3	6.58%	33.0	37.6
Selenium	0.95	19.1%	0.77	1.13
Silver	0.26	9.83%	0.23	0.29
Thallium	0.12	6.56%	0.11	0.13
Vanadium	18.8	3.31%	18.2	19.4
Zinc	145	5.42%	137	153
Other Inorganic Parameters (mg/kg)				
Cyanide	0.29	32.7%	0.20	0.38
Fluoride	503	28.8%	358	648
Essential Nutrients (mg/kg)				
Calcium	23,600	15.1%	20,027	27,173
Magnesium	8,670	2.18%	8,481	8,859
Potassium	1,540	6.91%	1,434	1,646
Sodium	1,420	21.1%	1,121	1,719
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-039			
	0.50-2.00			
	CFISS-039-SO-0.5-2			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.080	47.7%	0.042	0.12
Acenaphthene	0.71	80.9%	0.14	1.28
Acenaphthylene	0.029	62.8%	0.011	0.047
Anthracene	1.20	82.4%	0.21	2.19
Fluoranthene	10.0	71.4%	2.86	17.1
Fluorene	0.45	74.2%	0.12	0.78
Naphthalene	0.20	28.9%	0.14	0.26
Phenanthrene	6.10	78.1%	1.34	10.9
Total LMW PAHs - 1/2MDL	18.8	74.3%	4.83	32.7
Total LMW PAHs - MDL	18.8	74.3%	4.83	32.7
Total LMW PAHs - Zero	18.8	74.3%	4.83	32.7
Benzo(A)Pyrene	8.20	67.2%	2.69	13.7
Benzo(A)Anthracene	6.70	68.8%	2.09	11.3
Benzo(B)Fluoranthene	10.0	60.1%	3.99	16.0
Benzo(G,H,I)Perylene	12.0	60.8%	4.71	19.3
Benzo(K)Fluoranthene	3.50	64.5%	1.24	5.76
Chrysene	8.40	62.9%	3.11	13.7
Dibenz(A,H)Anthracene	2.60	63.9%	0.94	4.26
Indeno(1,2,3-C,D)Pyrene	11.0	62.0%	4.18	17.8
Pyrene	9.80	72.7%	2.67	16.9
Total HMW PAHs - 1/2MDL	72.2	64.7%	25.5	119
Total HMW PAHs - MDL	72.2	64.7%	25.5	119
Total HMW PAHs - Zero	72.2	64.7%	25.5	119
Total PAHs - 1/2MDL	80.9	68.3%	25.6	136
Total PAHs - MDL	80.9	68.3%	25.6	136
Total PAHs - Zero	80.9	68.3%	25.6	136
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.024	--	0.024	0.024
1,4-Dioxane (P-Dioxane)	0.085	--	0.085	0.085
2,3,4,6-Tetrachlorophenol	0.030	--	0.030	0.030
2,4,5-Trichlorophenol	0.032	--	0.032	0.032
2,4,6-Trichlorophenol	0.009	--	0.009	0.009
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.070	--	0.070	0.070

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-039			
	0.50-2.00			
	CFISS-039-SO-0.5-2			
	7/14/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.24	--	0.24	0.24
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.017	--	0.017	0.017
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.008	--	0.008	0.008
2-Methylphenol (O-Cresol)	0.014	--	0.014	0.014
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.036	--	0.036	0.036
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.085	--	0.085	0.085
4-Bromophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.008	--	0.008	0.008
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.012	--	0.012	0.012
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	41.1%	0.004	0.010
Atrazine	0.014	--	0.014	0.014
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.088	32.7%	0.059	0.12
Biphenyl (Diphenyl)	0.028	98.2%	4.95E-04	0.055
Bis(2-Chloroethoxy) Methane	0.010	--	0.010	0.010
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.013	--	0.013	0.013
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.023	--	0.023	0.023
Carbazole	0.88	76.1%	0.21	1.55
Dibenzofuran	0.23	70.0%	0.069	0.39
Diethyl Phthalate	0.009	--	0.009	0.009
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.016	--	0.016	0.016
Hexachlorobenzene	0.013	--	0.013	0.013
Hexachlorobutadiene	0.009	--	0.009	0.009
Hexachlorocyclopentadiene	0.020	--	0.020	0.020
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	32.5%	0.005	0.009
Nitrobenzene	0.010	--	0.010	0.010
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.029	--	0.029	0.029
Pentachlorophenol	0.039	--	0.039	0.039
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-040			
	0.00-0.50			
	CFISS-040-SO-0-0.5			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	22,000	4.68%	20,970	23,030
Antimony	0.54	28.1%	0.39	0.69
Arsenic	5.70	13.8%	4.91	6.49
Barium	120	4.03%	115	125
Beryllium	0.75	6.32%	0.70	0.80
Cadmium	0.63	15.0%	0.54	0.72
Chromium, Total	28.9	10.6%	25.8	32.0
Chromium, Hexavalent	0.77	10.6%	0.69	0.86
Chromium, Trivalent	28.1	10.6%	25.2	31.1
Cobalt	6.50	3.51%	6.27	6.73
Copper	29.9	12.3%	26.2	33.6
Iron	17,700	3.40%	17,098	18,302
Lead	45.4	48.5%	23.4	67.4
Manganese	405	5.63%	382	428
Mercury	0.009	54.9%	0.004	0.013
Nickel	42.8	14.5%	36.6	49.0
Selenium	1.10	20.0%	0.88	1.32
Silver	0.55	9.03%	0.50	0.60
Thallium	0.13	14.4%	0.11	0.15
Vanadium	20.1	9.21%	18.2	22.0
Zinc	101	12.7%	88.2	114
Other Inorganic Parameters (mg/kg)				
Cyanide	0.23	40.2%	0.14	0.32
Fluoride	349	20.5%	277	421
Essential Nutrients (mg/kg)				
Calcium	23,500	10.7%	20,993	26,007
Magnesium	10,500	2.82%	10,204	10,796
Potassium	1,750	6.24%	1,641	1,859
Sodium	1,240	30.7%	859	1,621
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-040			
	0.00-0.50			
	CFISS-040-SO-0-0.5			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.46	47.1%	0.24	0.68
Acenaphthene	3.80	42.0%	2.20	5.40
Acenaphthylene	0.043	36.1%	0.027	0.058
Anthracene	5.00	37.7%	3.12	6.88
Fluoranthene	35.0	37.3%	21.9	48.1
Fluorene	2.50	34.6%	1.63	3.37
Naphthalene	1.30	44.9%	0.72	1.88
Phenanthrene	27.0	31.0%	18.6	35.4
Total LMW PAHs - 1/2MDL	75.1	35.8%	48.2	102
Total LMW PAHs - MDL	75.1	35.8%	48.3	102
Total LMW PAHs - Zero	75.1	35.9%	48.1	102
Benzo(A)Pyrene	23.0	36.1%	14.7	31.3
Benzo(A)Anthracene	19.0	32.0%	12.9	25.1
Benzo(B)Fluoranthene	30.0	29.8%	21.0	39.0
Benzo(G,H,I)Perylene	26.0	30.8%	18.0	34.0
Benzo(K)Fluoranthene	9.90	31.3%	6.80	13.0
Chrysene	25.0	35.9%	16.0	34.0
Dibenz(A,H)Anthracene	5.70	39.8%	3.43	7.97
Indeno(1,2,3-C,D)Pyrene	25.0	31.1%	17.2	32.8
Pyrene	38.0	39.3%	23.1	52.9
Total HMW PAHs - 1/2MDL	202	26.8%	148	256
Total HMW PAHs - MDL	202	26.8%	148	256
Total HMW PAHs - Zero	202	26.8%	148	256
Total PAHs - 1/2MDL	246	29.6%	173	319
Total PAHs - MDL	246	29.5%	174	319
Total PAHs - Zero	246	29.6%	173	319
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.13	--	0.13	0.13
1,4-Dioxane (P-Dioxane)	0.45	--	0.45	0.45
2,3,4,6-Tetrachlorophenol	0.16	--	0.16	0.16
2,4,5-Trichlorophenol	0.17	--	0.17	0.17
2,4,6-Trichlorophenol	0.047	--	0.047	0.047
2,4-Dichlorophenol	0.039	--	0.039	0.039
2,4-Dimethylphenol	0.37	--	0.37	0.37

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-040			
	0.00-0.50			
	CFISS-040-SO-0-0.5			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	1.25	--	1.25	1.25
2,4-Dinitrotoluene	0.065	--	0.065	0.065
2,6-Dinitrotoluene	0.090	--	0.090	0.090
2-Chloronaphthalene	0.038	--	0.038	0.038
2-Chlorophenol	0.042	--	0.042	0.042
2-Methylphenol (O-Cresol)	0.070	--	0.070	0.070
2-Nitroaniline	0.055	--	0.055	0.055
2-Nitrophenol	0.055	--	0.055	0.055
3- And 4- Methylphenol (Total)	0.044	--	0.044	0.044
3,3'-Dichlorobenzidine	0.19	--	0.19	0.19
3-Nitroaniline	0.049	--	0.049	0.049
4,6-Dinitro-2-Methylphenol	0.44	--	0.44	0.44
4-Bromophenyl Phenyl Ether	0.050	--	0.050	0.050
4-Chloro-3-Methylphenol	0.070	--	0.070	0.070
4-Chloroaniline	0.043	--	0.043	0.043
4-Chlorophenyl Phenyl Ether	0.050	--	0.050	0.050
4-Nitroaniline	0.065	--	0.065	0.065
4-Nitrophenol	0.80	--	0.80	0.80
Acetophenone	0.036	44.4%	0.020	0.052
Atrazine	0.075	--	0.075	0.075
Benzaldehyde	0.13	--	0.13	0.13
Benzyl Butyl Phthalate	0.050	--	0.050	0.050
Biphenyl (Diphenyl)	0.14	49.7%	0.070	0.21
Bis(2-Chloroethoxy) Methane	0.050	--	0.050	0.050
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.039	--	0.039	0.039
Bis(2-Chloroisopropyl) Ether	0.070	--	0.070	0.070
Bis(2-Ethylhexyl) Phthalate	0.065	--	0.065	0.065
Caprolactam	0.12	--	0.12	0.12
Carbazole	3.20	30.5%	2.22	4.18
Dibenzofuran	1.30	33.5%	0.86	1.74
Diethyl Phthalate	0.047	--	0.047	0.047
Dimethyl Phthalate	0.048	--	0.048	0.048
Di-N-Butyl Phthalate	0.050	--	0.050	0.050
Di-N-Octylphthalate	0.085	--	0.085	0.085
Hexachlorobenzene	0.065	--	0.065	0.065
Hexachlorobutadiene	0.047	--	0.047	0.047
Hexachlorocyclopentadiene	0.11	--	0.11	0.11
Hexachloroethane	0.060	--	0.060	0.060
Isophorone	0.036	--	0.036	0.036
Nitrobenzene	0.050	--	0.050	0.050
N-Nitrosodi-N-Propylamine	0.055	--	0.055	0.055
N-Nitrosodiphenylamine	0.15	--	0.15	0.15
Pentachlorophenol	0.20	--	0.20	0.20
Phenol	0.055	--	0.055	0.055

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-040			
	0.50-2.00			
	CFISS-040-SO-0.5-2			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,000	4.58%	14,314	15,686
Antimony	0.14	70.4%	0.041	0.24
Arsenic	4.40	7.46%	4.07	4.73
Barium	139	9.24%	126	152
Beryllium	0.55	4.90%	0.52	0.58
Cadmium	0.12	6.03%	0.11	0.13
Chromium, Total	27.6	7.75%	25.5	29.7
Chromium, Hexavalent	0.74	7.75%	0.68	0.80
Chromium, Trivalent	26.9	7.75%	24.8	28.9
Cobalt	6.40	1.99%	6.27	6.53
Copper	15.4	4.63%	14.7	16.1
Iron	16,500	2.40%	16,104	16,896
Lead	14.1	3.33%	13.6	14.6
Manganese	451	7.15%	419	483
Mercury	0.008	27.4%	0.006	0.010
Nickel	22.5	6.58%	21.0	24.0
Selenium	0.97	19.1%	0.79	1.15
Silver	0.029	9.83%	0.026	0.032
Thallium	0.091	6.56%	0.085	0.097
Vanadium	13.5	3.31%	13.1	13.9
Zinc	50.9	5.42%	48.1	53.7
Other Inorganic Parameters (mg/kg)				
Cyanide	0.082	32.7%	0.055	0.11
Fluoride	136	28.8%	96.9	175
Essential Nutrients (mg/kg)				
Calcium	12,100	15.1%	10,268	13,932
Magnesium	9,410	2.18%	9,205	9,615
Potassium	1,110	6.91%	1,033	1,187
Sodium	195	21.1%	154	236
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-040			
	0.50-2.00			
	CFISS-040-SO-0.5-2			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.096	47.7%	0.050	0.14
Acenaphthene	0.86	80.9%	0.16	1.56
Acenaphthylene	0.015	62.8%	0.006	0.024
Anthracene	1.40	82.4%	0.25	2.55
Fluoranthene	7.10	71.4%	2.03	12.2
Fluorene	0.69	74.2%	0.18	1.20
Naphthalene	0.32	28.9%	0.23	0.41
Phenanthrene	6.50	78.1%	1.42	11.6
Total LMW PAHs - 1/2MDL	17.0	74.3%	4.37	29.6
Total LMW PAHs - MDL	17.0	74.3%	4.37	29.6
Total LMW PAHs - Zero	17.0	74.3%	4.37	29.6
Benzo(A)Pyrene	4.40	67.2%	1.44	7.36
Benzo(A)Anthracene	3.90	68.8%	1.22	6.58
Benzo(B)Fluoranthene	5.00	60.1%	2.00	8.00
Benzo(G,H,I)Perylene	4.80	60.8%	1.88	7.72
Benzo(K)Fluoranthene	2.00	64.5%	0.71	3.29
Chrysene	4.30	62.9%	1.59	7.01
Dibenz(A,H)Anthracene	0.94	63.9%	0.34	1.54
Indeno(1,2,3-C,D)Pyrene	4.70	62.0%	1.78	7.62
Pyrene	6.40	72.7%	1.75	11.1
Total HMW PAHs - 1/2MDL	36.4	64.7%	12.9	60.0
Total HMW PAHs - MDL	36.4	64.7%	12.9	60.0
Total HMW PAHs - Zero	36.4	64.7%	12.9	60.0
Total PAHs - 1/2MDL	48.3	68.3%	15.3	81.3
Total PAHs - MDL	48.3	68.3%	15.3	81.3
Total PAHs - Zero	48.3	68.3%	15.3	81.3
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-040			
	0.50-2.00			
	CFISS-040-SO-0.5-2			
	7/13/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.037	98.2%	6.66E-04	0.073
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.76	76.1%	0.18	1.34
Dibenzofuran	0.36	70.0%	0.11	0.61
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-041			
	0.00-0.50			
	CFISS-41-SO-0-0.5			
	7/16/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	15,500	4.68%	14,774	16,226
Antimony	0.53	28.1%	0.38	0.68
Arsenic	5.90	13.8%	5.08	6.72
Barium	117	4.03%	112	122
Beryllium	0.51	6.32%	0.48	0.54
Cadmium	0.51	15.0%	0.43	0.59
Chromium, Total	20.4	10.6%	18.2	22.6
Chromium, Hexavalent	0.55	10.6%	0.49	0.60
Chromium, Trivalent	19.9	10.6%	17.8	22.0
Cobalt	7.10	3.51%	6.85	7.35
Copper	45.7	12.3%	40.1	51.3
Iron	19,400	3.40%	18,741	20,059
Lead	36.1	48.5%	18.6	53.6
Manganese	523	5.63%	494	552
Mercury	0.008	54.9%	0.004	0.012
Nickel	31.1	14.5%	26.6	35.6
Selenium	1.10	20.0%	0.88	1.32
Silver	0.12	9.03%	0.11	0.13
Thallium	0.096	14.4%	0.082	0.11
Vanadium	13.9	9.21%	12.6	15.2
Zinc	137	12.7%	120	154
Other Inorganic Parameters (mg/kg)				
Cyanide	0.19	40.2%	0.11	0.27
Fluoride	84.3	20.5%	67.0	102
Essential Nutrients (mg/kg)				
Calcium	15,600	10.7%	13,936	17,264
Magnesium	7,680	2.82%	7,463	7,897
Potassium	990	6.24%	928	1,052
Sodium	136	30.7%	94.2	178
Pesticides (mg/kg)				
Aldrin	4.00E-04	--	4.00E-04	4.00E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.60E-04	--	4.60E-04	4.60E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.25E-04	--	3.25E-04	3.25E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.65E-04	--	3.65E-04	3.65E-04
Dieldrin	4.30E-04	--	4.30E-04	4.30E-04
Endosulfan Sulfate	3.85E-04	--	3.85E-04	3.85E-04
Endrin	4.20E-04	--	4.20E-04	4.20E-04
Endrin Aldehyde	4.10E-04	--	4.10E-04	4.10E-04
Endrin Ketone	4.60E-04	--	4.60E-04	4.60E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.25E-04	--	4.25E-04	4.25E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.35E-04	--	4.35E-04	4.35E-04
P,P'-DDE	4.80E-04	--	4.80E-04	4.80E-04
P,P'-DDT	3.45E-04	--	3.45E-04	3.45E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-041			
	0.00-0.50			
	CFISS-41-SO-0-0.5			
	7/16/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.80E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.80E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.093	47.1%	0.049	0.14
Acenaphthene	0.31	42.0%	0.18	0.44
Acenaphthylene	0.004	36.1%	0.003	0.006
Anthracene	0.59	37.7%	0.37	0.81
Fluoranthene	4.50	37.3%	2.82	6.18
Fluorene	0.26	34.6%	0.17	0.35
Naphthalene	0.28	44.9%	0.15	0.41
Phenanthrene	3.10	31.0%	2.14	4.06
Total LMW PAHs - 1/2MDL	9.14	35.8%	5.86	12.4
Total LMW PAHs - MDL	9.14	35.8%	5.87	12.4
Total LMW PAHs - Zero	9.13	35.9%	5.86	12.4
Benzo(A)Pyrene	3.50	36.1%	2.23	4.77
Benzo(A)Anthracene	3.00	32.0%	2.04	3.96
Benzo(B)Fluoranthene	4.40	29.8%	3.09	5.71
Benzo(G,H,I)Perylene	3.90	30.8%	2.70	5.10
Benzo(K)Fluoranthene	1.90	31.3%	1.31	2.49
Chrysene	3.90	35.9%	2.50	5.30
Dibenz(A,H)Anthracene	1.00	39.8%	0.60	1.40
Indeno(1,2,3-C,D)Pyrene	3.80	31.1%	2.62	4.98
Pyrene	5.60	39.3%	3.40	7.80
Total HMW PAHs - 1/2MDL	31.0	26.8%	22.7	39.3
Total HMW PAHs - MDL	31.0	26.8%	22.7	39.3
Total HMW PAHs - Zero	31.0	26.8%	22.7	39.3
Total PAHs - 1/2MDL	35.6	29.6%	25.1	46.2
Total PAHs - MDL	35.6	29.5%	25.1	46.2
Total PAHs - Zero	35.6	29.6%	25.1	46.2
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.012	--	0.012	0.012
1,4-Dioxane (P-Dioxane)	0.043	--	0.043	0.043
2,3,4,6-Tetrachlorophenol	0.015	--	0.015	0.015
2,4,5-Trichlorophenol	0.016	--	0.016	0.016
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.036	--	0.036	0.036

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-041			
	0.00-0.50			
	CFISS-41-SO-0-0.5			
	7/16/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.12	--	0.12	0.12
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.018	--	0.018	0.018
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.043	--	0.043	0.043
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	44.4%	0.002	0.005
Atrazine	0.007	--	0.007	0.007
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.029	--	0.029	0.029
Biphenyl (Diphenyl)	0.014	49.7%	0.007	0.021
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.44	30.5%	0.31	0.57
Dibenzofuran	0.17	33.5%	0.11	0.23
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.019	--	0.019	0.019
Di-N-Octylphthalate	0.008	--	0.008	0.008
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.010	--	0.010	0.010
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.003	--	0.003	0.003
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-041			
	0.50-2.00			
	CFISS-41-SO-0.5-2			
	7/16/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	21,200	4.58%	20,230	22,170
Antimony	0.25	70.4%	0.074	0.43
Arsenic	5.20	7.46%	4.81	5.59
Barium	270	9.24%	245	295
Beryllium	0.71	4.90%	0.68	0.74
Cadmium	0.17	6.03%	0.16	0.18
Chromium, Total	15.2	7.75%	14.0	16.4
Chromium, Hexavalent	0.41	7.75%	0.38	0.44
Chromium, Trivalent	14.8	7.75%	13.6	15.9
Cobalt	6.60	1.99%	6.47	6.73
Copper	30.7	4.63%	29.3	32.1
Iron	18,400	2.40%	17,958	18,842
Lead	14.8	3.33%	14.3	15.3
Manganese	658	7.15%	611	705
Mercury	0.009	27.4%	0.006	0.011
Nickel	15.3	6.58%	14.3	16.3
Selenium	1.10	19.1%	0.89	1.31
Silver	0.059	9.83%	0.053	0.065
Thallium	0.11	6.56%	0.10	0.12
Vanadium	17.1	3.31%	16.5	17.7
Zinc	92.1	5.42%	87.1	97.1
Other Inorganic Parameters (mg/kg)				
Cyanide	0.14	32.7%	0.094	0.19
Fluoride	79.1	28.8%	56.3	102
Essential Nutrients (mg/kg)				
Calcium	10,200	15.1%	8,656	11,744
Magnesium	7,480	2.18%	7,317	7,643
Potassium	1,010	6.91%	940	1,080
Sodium	175	21.1%	138	212
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-041			
	0.50-2.00			
	CFISS-41-SO-0.5-2			
	7/16/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.008	47.7%	0.004	0.012
Acenaphthene	0.022	80.9%	0.004	0.040
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.016	82.4%	0.003	0.029
Fluoranthene	0.28	71.4%	0.080	0.48
Fluorene	0.012	74.2%	0.003	0.021
Naphthalene	0.010	28.9%	0.007	0.013
Phenanthrene	0.18	78.1%	0.039	0.32
Total LMW PAHs - 1/2MDL	0.53	74.3%	0.14	0.93
Total LMW PAHs - MDL	0.55	74.3%	0.14	0.96
Total LMW PAHs - Zero	0.51	74.3%	0.13	0.89
Benzo(A)Pyrene	0.18	67.2%	0.059	0.30
Benzo(A)Anthracene	0.16	68.8%	0.050	0.27
Benzo(B)Fluoranthene	0.28	60.1%	0.11	0.45
Benzo(G,H,I)Perylene	0.13	60.8%	0.051	0.21
Benzo(K)Fluoranthene	0.091	64.5%	0.032	0.15
Chrysene	0.21	62.9%	0.078	0.34
Dibenz(A,H)Anthracene	0.009	63.9%	0.003	0.015
Indeno(1,2,3-C,D)Pyrene	0.14	62.0%	0.053	0.23
Pyrene	0.30	72.7%	0.082	0.52
Total HMW PAHs - 1/2MDL	1.50	64.7%	0.53	2.47
Total HMW PAHs - MDL	1.51	64.7%	0.53	2.49
Total HMW PAHs - Zero	1.49	64.7%	0.53	2.46
Total PAHs - 1/2MDL	1.74	68.3%	0.55	2.94
Total PAHs - MDL	1.77	68.3%	0.56	2.99
Total PAHs - Zero	1.72	68.3%	0.54	2.89
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.046	--	0.046	0.046
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.038	--	0.038	0.038

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-041			
	0.50-2.00			
	CFISS-41-SO-0.5-2			
	7/16/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.005	--	0.005	0.005
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.008	--	0.008	0.008
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.004	41.1%	0.002	0.005
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.015	98.2%	2.61E-04	0.029
Bis(2-Chloroethoxy) Methane	0.006	--	0.006	0.006
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.022	76.1%	0.005	0.039
Dibenzofuran	0.005	70.0%	0.001	0.009
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.005	--	0.005	0.005
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.016	--	0.016	0.016
Pentachlorophenol	0.021	--	0.021	0.021
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-042			
	0.00-0.50			
	CFISS-042-SO-0-0.5			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	24,100	4.68%	22,972	25,228
Antimony	3.60	28.1%	2.59	4.61
Arsenic	14.9	13.8%	12.8	17.0
Barium	153	4.03%	147	159
Beryllium	1.00	6.32%	0.94	1.06
Cadmium	0.89	15.0%	0.76	1.02
Chromium, Total	29.5	10.6%	26.4	32.6
Chromium, Hexavalent	0.79	10.6%	0.71	0.87
Chromium, Trivalent	28.7	10.6%	25.7	31.7
Cobalt	7.50	3.51%	7.24	7.76
Copper	345	12.3%	303	387
Iron	30,300	3.40%	29,270	31,330
Lead	83.1	48.5%	42.8	123
Manganese	470	5.63%	444	496
Mercury	0.021	54.9%	0.009	0.033
Nickel	55.7	14.5%	47.6	63.8
Selenium	0.86	20.0%	0.69	1.03
Silver	0.69	9.03%	0.63	0.75
Thallium	0.14	14.4%	0.12	0.16
Vanadium	21.5	9.21%	19.5	23.5
Zinc	751	12.7%	656	846
Other Inorganic Parameters (mg/kg)				
Cyanide	0.030	40.2%	0.018	0.042
Fluoride	632	20.5%	502	762
Essential Nutrients (mg/kg)				
Calcium	28,800	10.7%	25,728	31,872
Magnesium	7,240	2.82%	7,036	7,444
Potassium	1,530	6.24%	1,434	1,626
Sodium	2,470	30.7%	1,711	3,229
Pesticides (mg/kg)				
Aldrin	4.10E-04	--	4.10E-04	4.10E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.05E-04	--	3.05E-04	3.05E-04
Alpha Endosulfan	4.70E-04	--	4.70E-04	4.70E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.30E-04	--	3.30E-04	3.30E-04
Beta Endosulfan	5.50E-04	--	5.50E-04	5.50E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.70E-04	--	3.70E-04	3.70E-04
Dieldrin	4.40E-04	--	4.40E-04	4.40E-04
Endosulfan Sulfate	3.95E-04	--	3.95E-04	3.95E-04
Endrin	4.30E-04	--	4.30E-04	4.30E-04
Endrin Aldehyde	4.20E-04	--	4.20E-04	4.20E-04
Endrin Ketone	4.70E-04	--	4.70E-04	4.70E-04
Gamma Bhc (Lindane)	3.00E-04	--	3.00E-04	3.00E-04
Heptachlor	4.35E-04	--	4.35E-04	4.35E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.45E-04	--	4.45E-04	4.45E-04
P,P'-DDE	4.90E-04	--	4.90E-04	4.90E-04
P,P'-DDT	3.50E-04	--	3.50E-04	3.50E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-042			
	0.00-0.50			
	CFISS-042-SO-0-0.5			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.50E-04	--	7.50E-04	7.50E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	140%	-1.84E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.84E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.098	47.1%	0.052	0.14
Acenaphthene	0.30	42.0%	0.17	0.43
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	0.50	37.7%	0.31	0.69
Fluoranthene	6.60	37.3%	4.14	9.06
Fluorene	0.13	34.6%	0.085	0.18
Naphthalene	0.17	44.9%	0.094	0.25
Phenanthrene	3.50	31.0%	2.41	4.59
Total LMW PAHs - 1/2MDL	11.3	35.8%	7.26	15.4
Total LMW PAHs - MDL	11.3	35.8%	7.27	15.4
Total LMW PAHs - Zero	11.3	35.9%	7.24	15.4
Benzo(A)Pyrene	4.10	36.1%	2.62	5.58
Benzo(A)Anthracene	3.10	32.0%	2.11	4.09
Benzo(B)Fluoranthene	5.40	29.8%	3.79	7.01
Benzo(G,H,I)Perylene	6.30	30.8%	4.36	8.24
Benzo(K)Fluoranthene	2.20	31.3%	1.51	2.89
Chrysene	4.80	35.9%	3.08	6.52
Dibenz(A,H)Anthracene	1.40	39.8%	0.84	1.96
Indeno(1,2,3-C,D)Pyrene	5.50	31.1%	3.79	7.21
Pyrene	5.90	39.3%	3.58	8.22
Total HMW PAHs - 1/2MDL	38.7	26.8%	28.3	49.1
Total HMW PAHs - MDL	38.7	26.8%	28.3	49.1
Total HMW PAHs - Zero	38.7	26.8%	28.3	49.1
Total PAHs - 1/2MDL	44.5	29.6%	31.4	57.7
Total PAHs - MDL	44.5	29.5%	31.4	57.7
Total PAHs - Zero	44.5	29.6%	31.3	57.7
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.090	--	0.090	0.090
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.075	--	0.075	0.075

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-042			
	0.00-0.50			
	CFISS-042-SO-0-0.5			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.015	--	0.015	0.015
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.090	--	0.090	0.090
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.037	--	0.037	0.037
Biphenyl (Diphenyl)	0.028	49.7%	0.014	0.042
Bis(2-Chloroethoxy) Methane	0.011	--	0.011	0.011
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.57	30.5%	0.40	0.74
Dibenzofuran	0.097	33.5%	0.065	0.13
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.010	--	0.010	0.010
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.014	--	0.014	0.014
Hexachlorobutadiene	0.010	--	0.010	0.010
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.033	--	0.033	0.033

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-042			
	0.50-2.00			
	CFISS-042-SO-0.5-2			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	18,500	4.58%	17,654	19,346
Antimony	0.13	70.4%	0.038	0.22
Arsenic	4.40	7.46%	4.07	4.73
Barium	256	9.24%	232	280
Beryllium	0.79	4.90%	0.75	0.83
Cadmium	0.23	6.03%	0.22	0.24
Chromium, Total	15.2	7.75%	14.0	16.4
Chromium, Hexavalent	0.41	7.75%	0.38	0.44
Chromium, Trivalent	14.8	7.75%	13.6	15.9
Cobalt	6.20	1.99%	6.08	6.32
Copper	20.7	4.63%	19.7	21.7
Iron	15,800	2.40%	15,421	16,179
Lead	17.1	3.33%	16.5	17.7
Manganese	654	7.15%	607	701
Mercury	0.026	27.4%	0.019	0.033
Nickel	16.5	6.58%	15.4	17.6
Selenium	0.82	19.1%	0.66	0.98
Silver	0.13	9.83%	0.12	0.14
Thallium	0.098	6.56%	0.092	0.10
Vanadium	15.0	3.31%	14.5	15.5
Zinc	69.7	5.42%	65.9	73.5
Other Inorganic Parameters (mg/kg)				
Cyanide	0.26	32.7%	0.18	0.34
Fluoride	99.2	28.8%	70.7	128
Essential Nutrients (mg/kg)				
Calcium	18,300	15.1%	15,529	21,071
Magnesium	7,610	2.18%	7,444	7,776
Potassium	974	6.91%	907	1,041
Sodium	339	21.1%	268	410
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-042			
	0.50-2.00			
	CFISS-042-SO-0.5-2			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.031	47.7%	0.016	0.046
Acenaphthene	0.16	80.9%	0.030	0.29
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.21	82.4%	0.037	0.38
Fluoranthene	2.40	71.4%	0.69	4.11
Fluorene	0.086	74.2%	0.022	0.15
Naphthalene	0.041	28.9%	0.029	0.053
Phenanthrene	1.30	78.1%	0.28	2.32
Total LMW PAHs - 1/2MDL	4.23	74.3%	1.09	7.38
Total LMW PAHs - MDL	4.24	74.3%	1.09	7.38
Total LMW PAHs - Zero	4.23	74.3%	1.09	7.37
Benzo(A)Pyrene	1.50	67.2%	0.49	2.51
Benzo(A)Anthracene	1.20	68.8%	0.37	2.03
Benzo(B)Fluoranthene	1.80	60.1%	0.72	2.88
Benzo(G,H,I)Perylene	1.30	60.8%	0.51	2.09
Benzo(K)Fluoranthene	0.78	64.5%	0.28	1.28
Chrysene	1.60	62.9%	0.59	2.61
Dibenz(A,H)Anthracene	0.32	63.9%	0.12	0.52
Indeno(1,2,3-C,D)Pyrene	1.30	62.0%	0.49	2.11
Pyrene	2.60	72.7%	0.71	4.49
Total HMW PAHs - 1/2MDL	12.4	64.7%	4.38	20.4
Total HMW PAHs - MDL	12.4	64.7%	4.38	20.4
Total HMW PAHs - Zero	12.4	64.7%	4.38	20.4
Total PAHs - 1/2MDL	14.8	68.3%	4.69	24.9
Total PAHs - MDL	14.8	68.3%	4.69	24.9
Total PAHs - Zero	14.8	68.3%	4.69	24.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.046	--	0.046	0.046
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.038	--	0.038	0.038

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-042			
	0.50-2.00			
	CFISS-042-SO-0.5-2			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.008	--	0.008	0.008
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.005	--	0.005	0.005
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.045	--	0.045	0.045
4-Bromophenyl Phenyl Ether	0.006	--	0.006	0.006
4-Chloro-3-Methylphenol	0.008	--	0.008	0.008
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.007	--	0.007	0.007
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.012	41.1%	0.007	0.017
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.015	98.2%	2.61E-04	0.029
Bis(2-Chloroethoxy) Methane	0.006	--	0.006	0.006
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.20	76.1%	0.048	0.35
Dibenzofuran	0.042	70.0%	0.013	0.071
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.014	--	0.014	0.014
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.006	--	0.006	0.006
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.016	--	0.016	0.016
Pentachlorophenol	0.021	--	0.021	0.021
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-043			
	0.00-0.50			
	CFISS-043-SO-0-0.5			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	32,300	4.68%	30,788	33,812
Antimony	1.30	28.1%	0.94	1.66
Arsenic	7.20	13.8%	6.20	8.20
Barium	136	4.03%	131	141
Beryllium	0.98	6.32%	0.92	1.04
Cadmium	0.53	15.0%	0.45	0.61
Chromium, Total	23.8	10.6%	21.3	26.3
Chromium, Hexavalent	0.64	10.6%	0.57	0.70
Chromium, Trivalent	23.2	10.6%	20.7	25.6
Cobalt	6.40	3.51%	6.18	6.62
Copper	104	12.3%	91.2	117
Iron	20,000	3.40%	19,320	20,680
Lead	46.2	48.5%	23.8	68.6
Manganese	422	5.63%	398	446
Mercury	0.023	54.9%	0.010	0.036
Nickel	44.7	14.5%	38.2	51.2
Selenium	0.73	20.0%	0.58	0.88
Silver	1.10	9.03%	1.00	1.20
Thallium	0.14	14.4%	0.12	0.16
Vanadium	20.9	9.21%	19.0	22.8
Zinc	284	12.7%	248	320
Other Inorganic Parameters (mg/kg)				
Cyanide	0.27	40.2%	0.16	0.38
Fluoride	534	20.5%	424	644
Essential Nutrients (mg/kg)				
Calcium	22,200	10.7%	19,832	24,568
Magnesium	8,210	2.82%	7,978	8,442
Potassium	1,510	6.24%	1,416	1,604
Sodium	2,100	30.7%	1,454	2,746
Pesticides (mg/kg)				
Aldrin	3.95E-04	--	3.95E-04	3.95E-04
Alpha Bhc (Alpha Hexachlorocyclohexane)	3.00E-04	--	3.00E-04	3.00E-04
Alpha Endosulfan	4.55E-04	--	4.55E-04	4.55E-04
Beta Bhc (Beta Hexachlorocyclohexane)	3.20E-04	--	3.20E-04	3.20E-04
Beta Endosulfan	5.00E-04	--	5.00E-04	5.00E-04
cis-Chlordane	5.50E-04	--	5.50E-04	5.50E-04
Delta BHC (Delta Hexachlorocyclohexane)	3.60E-04	--	3.60E-04	3.60E-04
Dieldrin	4.25E-04	--	4.25E-04	4.25E-04
Endosulfan Sulfate	3.80E-04	--	3.80E-04	3.80E-04
Endrin	4.15E-04	--	4.15E-04	4.15E-04
Endrin Aldehyde	4.05E-04	--	4.05E-04	4.05E-04
Endrin Ketone	4.55E-04	--	4.55E-04	4.55E-04
Gamma Bhc (Lindane)	2.95E-04	--	2.95E-04	2.95E-04
Heptachlor	4.20E-04	--	4.20E-04	4.20E-04
Heptachlor Epoxide	6.50E-04	--	6.50E-04	6.50E-04
Methoxychlor	7.00E-04	--	7.00E-04	7.00E-04
P,P'-DDD	4.30E-04	--	4.30E-04	4.30E-04
P,P'-DDE	4.75E-04	--	4.75E-04	4.75E-04
P,P'-DDT	3.40E-04	--	3.40E-04	3.40E-04

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-043			
	0.00-0.50			
	CFISS-043-SO-0-0.5			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	0.010	--	0.010	0.010
trans-Chlordane	7.00E-04	--	7.00E-04	7.00E-04
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.004	--	0.004	0.004
PCB-1221 (Aroclor 1221)	0.004	--	0.004	0.004
PCB-1232 (Aroclor 1232)	0.004	--	0.004	0.004
PCB-1242 (Aroclor 1242)	0.004	--	0.004	0.004
PCB-1248 (Aroclor 1248)	0.004	--	0.004	0.004
PCB-1254 (Aroclor 1254)	0.005	140%	-1.78E-03	0.011
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	140%	-1.78E-03	0.011
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.047	47.1%	0.025	0.069
Acenaphthene	0.37	42.0%	0.21	0.53
Acenaphthylene	0.009	36.1%	0.005	0.012
Anthracene	1.00	37.7%	0.62	1.38
Fluoranthene	10.0	37.3%	6.27	13.7
Fluorene	0.25	34.6%	0.16	0.34
Naphthalene	0.094	44.9%	0.052	0.14
Phenanthrene	4.30	31.0%	2.97	5.63
Total LMW PAHs - 1/2MDL	16.1	35.8%	10.3	21.8
Total LMW PAHs - MDL	16.1	35.8%	10.3	21.8
Total LMW PAHs - Zero	16.1	35.9%	10.3	21.8
Benzo(A)Pyrene	8.50	36.1%	5.43	11.6
Benzo(A)Anthracene	6.80	32.0%	4.62	8.98
Benzo(B)Fluoranthene	9.80	29.8%	6.88	12.7
Benzo(G,H,I)Perylene	11.0	30.8%	7.61	14.4
Benzo(K)Fluoranthene	3.90	31.3%	2.68	5.12
Chrysene	10.0	35.9%	6.41	13.6
Dibenz(A,H)Anthracene	2.50	39.8%	1.50	3.50
Indeno(1,2,3-C,D)Pyrene	9.50	31.1%	6.54	12.5
Pyrene	9.70	39.3%	5.88	13.5
Total HMW PAHs - 1/2MDL	71.7	26.8%	52.5	90.9
Total HMW PAHs - MDL	71.7	26.8%	52.5	90.9
Total HMW PAHs - Zero	71.7	26.8%	52.5	90.9
Total PAHs - 1/2MDL	77.9	29.6%	54.9	101
Total PAHs - MDL	77.9	29.5%	54.9	101
Total PAHs - Zero	77.9	29.6%	54.9	101
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.025	--	0.025	0.025
1,4-Dioxane (P-Dioxane)	0.085	--	0.085	0.085
2,3,4,6-Tetrachlorophenol	0.031	--	0.031	0.031
2,4,5-Trichlorophenol	0.033	--	0.033	0.033
2,4,6-Trichlorophenol	0.010	--	0.010	0.010
2,4-Dichlorophenol	0.008	--	0.008	0.008
2,4-Dimethylphenol	0.070	--	0.070	0.070

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-043			
	0.00-0.50			
	CFISS-043-SO-0-0.5			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.25	--	0.25	0.25
2,4-Dinitrotoluene	0.013	--	0.013	0.013
2,6-Dinitrotoluene	0.018	--	0.018	0.018
2-Chloronaphthalene	0.008	--	0.008	0.008
2-Chlorophenol	0.009	--	0.009	0.009
2-Methylphenol (O-Cresol)	0.014	--	0.014	0.014
2-Nitroaniline	0.011	--	0.011	0.011
2-Nitrophenol	0.011	--	0.011	0.011
3- And 4- Methylphenol (Total)	0.009	--	0.009	0.009
3,3'-Dichlorobenzidine	0.037	--	0.037	0.037
3-Nitroaniline	0.010	--	0.010	0.010
4,6-Dinitro-2-Methylphenol	0.085	--	0.085	0.085
4-Bromophenyl Phenyl Ether	0.011	--	0.011	0.011
4-Chloro-3-Methylphenol	0.014	--	0.014	0.014
4-Chloroaniline	0.009	--	0.009	0.009
4-Chlorophenyl Phenyl Ether	0.010	--	0.010	0.010
4-Nitroaniline	0.013	--	0.013	0.013
4-Nitrophenol	0.16	--	0.16	0.16
Acetophenone	0.007	44.4%	0.004	0.010
Atrazine	0.015	--	0.015	0.015
Benzaldehyde	0.025	--	0.025	0.025
Benzyl Butyl Phthalate	0.73	--	0.73	0.73
Biphenyl (Diphenyl)	0.028	49.7%	0.014	0.042
Bis(2-Chloroethoxy) Methane	0.010	--	0.010	0.010
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.008	--	0.008	0.008
Bis(2-Chloroisopropyl) Ether	0.014	--	0.014	0.014
Bis(2-Ethylhexyl) Phthalate	0.013	--	0.013	0.013
Caprolactam	0.024	--	0.024	0.024
Carbazole	0.82	30.5%	0.57	1.07
Dibenzofuran	0.12	33.5%	0.080	0.16
Diethyl Phthalate	0.010	--	0.010	0.010
Dimethyl Phthalate	0.010	--	0.010	0.010
Di-N-Butyl Phthalate	0.052	--	0.052	0.052
Di-N-Octylphthalate	0.017	--	0.017	0.017
Hexachlorobenzene	0.013	--	0.013	0.013
Hexachlorobutadiene	0.009	--	0.009	0.009
Hexachlorocyclopentadiene	0.021	--	0.021	0.021
Hexachloroethane	0.012	--	0.012	0.012
Isophorone	0.007	--	0.007	0.007
Nitrobenzene	0.011	--	0.011	0.011
N-Nitrosodi-N-Propylamine	0.011	--	0.011	0.011
N-Nitrosodiphenylamine	0.030	--	0.030	0.030
Pentachlorophenol	0.040	--	0.040	0.040
Phenol	0.011	--	0.011	0.011

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-043			
	0.50-2.00			
	CFISS-043-SO-0.5-2			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
TAL Metals (mg/kg)				
Aluminum	17,300	4.58%	16,508	18,092
Antimony	0.15	70.4%	0.044	0.26
Arsenic	4.10	7.46%	3.79	4.41
Barium	206	9.24%	187	225
Beryllium	0.84	4.90%	0.80	0.88
Cadmium	0.19	6.03%	0.18	0.20
Chromium, Total	19.7	7.75%	18.2	21.2
Chromium, Hexavalent	0.53	7.75%	0.49	0.57
Chromium, Trivalent	19.2	7.75%	17.7	20.7
Cobalt	6.00	1.99%	5.88	6.12
Copper	29.3	4.63%	27.9	30.7
Iron	14,800	2.40%	14,445	15,155
Lead	15.5	3.33%	15.0	16.0
Manganese	560	7.15%	520	600
Mercury	0.027	27.4%	0.020	0.034
Nickel	20.4	6.58%	19.1	21.7
Selenium	0.80	19.1%	0.65	0.95
Silver	0.086	9.83%	0.078	0.094
Thallium	0.090	6.56%	0.084	0.096
Vanadium	13.6	3.31%	13.1	14.1
Zinc	69.9	5.42%	66.1	73.7
Other Inorganic Parameters (mg/kg)				
Cyanide	0.13	32.7%	0.088	0.17
Fluoride	225	28.8%	160	290
Essential Nutrients (mg/kg)				
Calcium	18,500	15.1%	15,699	21,301
Magnesium	9,150	2.18%	8,950	9,350
Potassium	1,030	6.91%	959	1,101
Sodium	537	21.1%	424	650
Pesticides (mg/kg)				
Aldrin	--	--	--	--
Alpha Bhc (Alpha Hexachlorocyclohexane)	--	--	--	--
Alpha Endosulfan	--	--	--	--
Beta Bhc (Beta Hexachlorocyclohexane)	--	--	--	--
Beta Endosulfan	--	--	--	--
cis-Chlordane	--	--	--	--
Delta BHC (Delta Hexachlorocyclohexane)	--	--	--	--
Dieldrin	--	--	--	--
Endosulfan Sulfate	--	--	--	--
Endrin	--	--	--	--
Endrin Aldehyde	--	--	--	--
Endrin Ketone	--	--	--	--
Gamma Bhc (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor Epoxide	--	--	--	--
Methoxychlor	--	--	--	--
P,P'-DDD	--	--	--	--
P,P'-DDE	--	--	--	--
P,P'-DDT	--	--	--	--

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-043			
	0.50-2.00			
	CFISS-043-SO-0.5-2			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
Toxaphene	--	--	--	--
trans-Chlordane	--	--	--	--
Polychlorinated Biphenyls (PCBs) (mg/kg)				
PCB-1016 (Aroclor 1016)	0.005	--	0.005	0.005
PCB-1221 (Aroclor 1221)	0.005	--	0.005	0.005
PCB-1232 (Aroclor 1232)	0.005	--	0.005	0.005
PCB-1242 (Aroclor 1242)	0.005	--	0.005	0.005
PCB-1248 (Aroclor 1248)	0.005	--	0.005	0.005
PCB-1254 (Aroclor 1254)	0.005	29.2%	0.003	0.006
PCB-1260 (Aroclor 1260)	0.005	--	0.005	0.005
PCB-1262 (Aroclor 1262)	0.005	--	0.005	0.005
PCB-1268 (Aroclor 1268)	0.005	--	0.005	0.005
Polychlorinated Biphenyl (PCBs)	0.005	29.2%	0.003	0.006
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)				
2-Methylnaphthalene	0.030	47.7%	0.016	0.044
Acenaphthene	0.14	80.9%	0.027	0.25
Acenaphthylene	0.004	62.8%	0.002	0.007
Anthracene	0.28	82.4%	0.049	0.51
Fluoranthene	2.20	71.4%	0.63	3.77
Fluorene	0.12	74.2%	0.031	0.21
Naphthalene	0.067	28.9%	0.048	0.086
Phenanthrene	1.40	78.1%	0.31	2.49
Total LMW PAHs - 1/2MDL	4.24	74.3%	1.09	7.39
Total LMW PAHs - MDL	4.25	74.3%	1.09	7.40
Total LMW PAHs - Zero	4.24	74.3%	1.09	7.38
Benzo(A)Pyrene	1.30	67.2%	0.43	2.17
Benzo(A)Anthracene	1.10	68.8%	0.34	1.86
Benzo(B)Fluoranthene	1.80	60.1%	0.72	2.88
Benzo(G,H,I)Perylene	1.20	60.8%	0.47	1.93
Benzo(K)Fluoranthene	0.63	64.5%	0.22	1.04
Chrysene	1.50	62.9%	0.56	2.44
Dibenz(A,H)Anthracene	0.25	63.9%	0.090	0.41
Indeno(1,2,3-C,D)Pyrene	1.30	62.0%	0.49	2.11
Pyrene	2.10	72.7%	0.57	3.63
Total HMW PAHs - 1/2MDL	11.2	64.7%	3.94	18.4
Total HMW PAHs - MDL	11.2	64.7%	3.94	18.4
Total HMW PAHs - Zero	11.2	64.7%	3.94	18.4
Total PAHs - 1/2MDL	13.6	68.3%	4.30	22.9
Total PAHs - MDL	13.6	68.3%	4.31	22.9
Total PAHs - Zero	13.6	68.3%	4.30	22.9
TCL Semi-Volatile Organic Compounds (TCL SVOCs) (mg/kg)				
1,2,4,5-Tetrachlorobenzene	0.013	--	0.013	0.013
1,4-Dioxane (P-Dioxane)	0.044	--	0.044	0.044
2,3,4,6-Tetrachlorophenol	0.016	--	0.016	0.016
2,4,5-Trichlorophenol	0.017	--	0.017	0.017
2,4,6-Trichlorophenol	0.005	--	0.005	0.005
2,4-Dichlorophenol	0.004	--	0.004	0.004
2,4-Dimethylphenol	0.037	--	0.037	0.037

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Sample Location Name Depth interval (ft) Sample Name Sample Date	CFISS-043			
	0.50-2.00			
	CFISS-043-SO-0.5-2			
	7/18/2016			
Constituent	Result Value	RSD	RSD Lower	RSD Upper
2,4-Dinitrophenol	0.13	--	0.13	0.13
2,4-Dinitrotoluene	0.007	--	0.007	0.007
2,6-Dinitrotoluene	0.009	--	0.009	0.009
2-Chloronaphthalene	0.004	--	0.004	0.004
2-Chlorophenol	0.004	--	0.004	0.004
2-Methylphenol (O-Cresol)	0.007	--	0.007	0.007
2-Nitroaniline	0.006	--	0.006	0.006
2-Nitrophenol	0.006	--	0.006	0.006
3- And 4- Methylphenol (Total)	0.004	--	0.004	0.004
3,3'-Dichlorobenzidine	0.019	--	0.019	0.019
3-Nitroaniline	0.005	--	0.005	0.005
4,6-Dinitro-2-Methylphenol	0.044	--	0.044	0.044
4-Bromophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Chloro-3-Methylphenol	0.007	--	0.007	0.007
4-Chloroaniline	0.004	--	0.004	0.004
4-Chlorophenyl Phenyl Ether	0.005	--	0.005	0.005
4-Nitroaniline	0.006	--	0.006	0.006
4-Nitrophenol	0.080	--	0.080	0.080
Acetophenone	0.008	41.1%	0.004	0.011
Atrazine	0.008	--	0.008	0.008
Benzaldehyde	0.013	--	0.013	0.013
Benzyl Butyl Phthalate	0.005	32.7%	0.003	0.007
Biphenyl (Diphenyl)	0.014	98.2%	2.52E-04	0.028
Bis(2-Chloroethoxy) Methane	0.005	--	0.005	0.005
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	0.004	--	0.004	0.004
Bis(2-Chloroisopropyl) Ether	0.007	--	0.007	0.007
Bis(2-Ethylhexyl) Phthalate	0.007	--	0.007	0.007
Caprolactam	0.012	--	0.012	0.012
Carbazole	0.19	76.1%	0.045	0.33
Dibenzofuran	0.065	70.0%	0.019	0.11
Diethyl Phthalate	0.005	--	0.005	0.005
Dimethyl Phthalate	0.005	--	0.005	0.005
Di-N-Butyl Phthalate	0.018	--	0.018	0.018
Di-N-Octylphthalate	0.009	--	0.009	0.009
Hexachlorobenzene	0.007	--	0.007	0.007
Hexachlorobutadiene	0.005	--	0.005	0.005
Hexachlorocyclopentadiene	0.011	--	0.011	0.011
Hexachloroethane	0.006	--	0.006	0.006
Isophorone	0.004	32.5%	0.002	0.005
Nitrobenzene	0.005	--	0.005	0.005
N-Nitrosodi-N-Propylamine	0.006	--	0.006	0.006
N-Nitrosodiphenylamine	0.015	--	0.015	0.015
Pentachlorophenol	0.020	--	0.020	0.020
Phenol	0.006	--	0.006	0.006

Appendix J2
Summary of RSD-Adjusted Results for Non-Replicate ISS Soil Samples
Baseline Ecological Risk Assessment
Columbia Falls Aluminum Company
Columbia Falls, Montana

Notes:

--: Not Applicable or not measured or calculated

Gray: Non-detect result replaced by 1/2 the MDL

HMW - High molecular weight

LMW - Low molecular weight

MDL: Method Detection Limit

mg/kg - milligram per kilogram

PAH - Polycyclic Aromatic Hydrocarbons

PCB - Polychlorinated Biphenyls

RSD: Relative Standard Deviation

The mean value derived from the RSDs of 4 triplicate ISS samples. See Roux Data Summary Report (Roux, 2019).

RSD Lower: Measured result adjusted downwards by the RSD.

RSD Upper: Measured result adjusted upwards by the RSD.

SVOC - Semi-volatile organic compound

TAL - Target Analyte List

TCL - Target Compound List