USEPA comments on the Draft Baseline Ecological Risk Assessment Work Plan
Columbia Falls Aluminum Company NPL Site
Columbia Falls, Montana

Responses Prepared for Columbia Falls Aluminum Company, LLC by Roux / EHS Support, LLC
Dated February 13, 2018

Specific Comments – USEPA Comments in Black. **Roux / EHS Support LLC responses in blue. USEPA Response to Roux / EHS Support LLC responses are in green. Responses are only included when further discussion or follow-up may be needed. Roux / EHS Support LLC responses in orange.**

1) Section 1.0 (Page 1) – Please add "Superfund" when first mentioning the Site name.

   The BERA Work Plan (WP) will be modified to include "Superfund" when first mentioning the Site name.

2) Section 3.1 (Page 10) – It is inappropriate to include comparisons of dioxin and furan levels to U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) in a BERA workplan. Remove these comparisons and discussion.

   The reference to USEPA RSLs for dioxins/furans was in a general bulleted summary of the Phase I Site Characterization Data Summary Report findings. The bullet will be removed to avoid confusion in the BERA WP.

   As indicated during the January 17, 2018 conference call with USEPA and Montana Department of Environmental Quality (MDEQ), ecological exposure to dioxins/furans measured in soil samples collected in the Main Plant Area will be evaluated as part of the COPEC refinement in the Revised BERA WP based on the toxicity equivalency quotient (TEQ) approach (USEPA, 2008). Any additional dioxin/furan data collected during the Phase 2 Investigation will be evaluated based on the TEQ approach in the BERA Report. The risk characterization of dioxin/furan TEQs will consider the current and future availability of ecological habitat in the Main Plant Area where soil samples were collected.

3) Section 3.3.5 (Page 16) – The table summarizing semi-aquatic surrogate receptors does not include an avian insectivore. Please add a surrogate an avian receptor representing this feeding guild.

   The table of semi-aquatic receptors will be updated to include American dipper (*Cinclus mexicanus*) as a surrogate to represent the avian insectivore feeding guild.

4) Section 3.3.5 (Page 16) – There is discussion of threatened species and proposed threatened species, however, follow-up discussion is needed to state how this information is going to be used in the BERA. Please include information to describe how the BERA risk characterization for threatened species will differ from non-threatened species.

The identification of assessment and measurement endpoints in Section 3.5 and Tables 7-9 of the BERA WP will be modified to indicate how potential special status species will be addressed in the risk characterization. Consistent with Ecological Risk Assessment Guidance for Superfund (ERAGS), potential exposure to threatened species will be evaluated based on the individual-level, as opposed to population level. The evaluation of potential ecological effects on individual threatened species will be based on comparisons of estimated daily doses to no observed adverse effects levels (NOAEL) toxicity reference values (TRVs).

5) Section 3.3.6 (Page 17) – The "Ecotoxicity of Constituent of Potential Concern" discussion is very thorough and includes many studies. Please provide conclusion statements for each section stating how this information will be used in the BERA.

   Concluding statements will be added to each sub-section in Section 3.3.6 (Ecotoxicity of Constituents of Potential Concern) of the Revised BERA WP to describe how the toxicity information will be used in the BERA.

6) Section 3.4 (Page 21) – Chemicals of potential ecological concern (COPECs) retained in the screening-level ecological risk assessment (SLERA) due to inadequate method detection limits (MDLs) or those lacking ecological screening values (ESVs) should be evaluated in the BERA as part of the uncertainty evaluation. As stated in The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments (USEPA 2001), "If, for example, the SLERA indicates that adverse ecological effects are possible at environmental concentrations below standard quantitation limits, a "non-detect" based on those limits cannot be used as the sole basis for a "no risk" decision". Additional basis for a "no risk" decision would include an evaluation of MDL adequacy for those chemicals where analytical results were non-detect to ensure the MDLs are low enough to support ecological risk management decision making. The BERA must also include a comparison of chemical concentrations in Site media versus background for those chemicals without ESVs.

   COPECs retained in the SLERA due to inadequate MDLs or constituents lacking ESVs will be addressed in the Problem Formulation and Uncertainty Evaluation sections in the BERA. The COPEC refinement presented in the BERA WP included an evaluation of COPECs identified in the SLERA based on detection limits exceeding minimum ESVs. The refinement of these COPECs included an evaluation of the potential for adverse effects based on comparisons of the MDL to alternate chronic ESVs. For COPECs with MDLs between minimum ESVs and alternate chronic ESVs, the potential for adverse effects and the associated uncertainty with MDLs is considered to be low. SLERA COPECs lacking ESVs were carried forward in the BERA process. Where appropriate, concentrations of COPECs that lack ESVs will be evaluated relative to an appropriate background dataset. These evaluations will be revisited in the Problem Formulation and Uncertainty Evaluation sections of the BERA.

7) Section 3.4 (Page 22) – As discussed in USEPA (2001), re-screening chemicals based on refined ESVs for the purposes of refining the list of COPECs may be appropriate for the BERA, but does not belong in this stage of the risk assessment process (i.e., the BERA workplan). Please revise the workplan accordingly.

The refinement of COPECs is consistent with Section 3.2 of ERAGS as part of the BERA Problem Formulation. Supplemental federal guidance on ecological risk assessment identifies COPEC refinement as an important step to focus the ecological risk assessment process (USEPA, 2015; TSERAWG, 2008; USEPA, 2000; U.S. Navy, 1999). In practice, COPEC refinement is often conducted as a refinement step in the SLERA intended to focus the BERA Problem Formulation. COPEC refinement was not included as part of the SLERA submitted for the Site; therefore, a refinement step was included in the BERA WP Problem Formulation to identify and focus further ecological risk analyses on COPECs that have the potential to drive ecological risk in the BERA.

EPA Response: Refinement of COPECs would be appropriate if it has been demonstrated that the Site has been adequately characterized. Because additional data are being collected to characterize spatial and temporal variability, this refinement is not appropriate at this time.

Re-screening constituents based on refined ESVs is a critical component of the COPEC refinement step given the conservative assumptions that were included in the SLERA screening process. For detected constituents with available ESVs, the SLERA identified COPECs based on maximum detected concentrations exceeding minimum ESVs. While this screening approach has a low probability of erroneously removing constituents that may pose an actual ecological risk, it is not indicative of COPECs that are likely to result in adverse ecological effects. Re-screening constituents based on refined ESVs that are protective of chronic exposure, but represent a broader range of no observed effect concentration (NOEC) endpoints, focuses further risk analysis on those COPECs that have greater potential to result in adverse ecological effects. The uncertainty in erroneously removing constituents from the BERA based on refined ESVs is limited to constituents with maximum concentrations that occur within the concentration range between the minimum ESV and refined ESV values. Given that minimum ESVs used in the SLERA and refined ESVs presented in the BERA WP are representative of chronic NOEC endpoints, there is a low probability that a constituent with a maximum concentration within this range will pose an actual ecological risk.

EPA Response: Screening of data to be collected in the next phase should be performed using the original screening values because spatial and temporal variability hasn't been characterized. If refined ESVs are to be developed in the future, agreement on the range of no observed effect concentration (NOEC) endpoints is needed as these have not been specified. The last statement in the paragraph above assumed that the Site has been adequately characterized and therefore is inappropriate to assume.

The BERA WP will be revised to indicate that COPEC re-screening conducted as part of the refinement step in the BERA Problem Formulation will include comparisons of maximum concentrations in samples collected in Phase 1 and Phase 2 to refined ESVs. All individual constituents included in analytical suites proposed in the Phase 2 Sampling and Analysis Plan (SAP), specifically metals, cyanide, fluoride, semi-volatile organic compounds (SVOCs), will be re-screened based on the combined Phase 1 and Phase 2 data for each exposure medium sampled within each exposure area. If a refined ESV is not derived for a constituent, the minimum ESV used in the SLERA screening will be used in the COPEC refinement in the BERA Problem Formulation. Given that there is a low probability that constituents with maximum

concentrations within the range of minimum chronic NOEC ESVs and refined chronic NOEC ESVs pose an ecological risk, re-screening Phase 1 and Phase 2 data based only on the minimum ESVs presented in the SLERA will not materially reduce the uncertainty in selecting COPECs for further analysis in the BERA. Further, re-screening Phase 1 and Phase 2 data based only on minimum ESVs will not effectively focus further risk analysis on those COPECs that have greater potential to result in adverse ecological effects, requiring an additional screening step based on refined ESVs. Therefore, it is proposed that COPEC re-screening conducted as part of the refinement step in the BERA Problem Formulation be streamlined to include only comparisons of maximum Phase 1 and Phase 2 concentrations to refined ESVs.

EPA Response: As discussed in the conference call to review these comments, it is not appropriate to use refined screening values is review of data collected in the next phase because these data may characterize areas of the Site or conditions at the Site not previously evaluated using the original screening values.

Roux/EHS Response: The BERA WP will be revised to indicate that Phase I and Phase II data will be screened in a tiered approach:

1) Maximum concentrations of constituents in Phase I and Phase datasets will be initially II compared to minimum ESVs presented in the SLERA; and
2) COPECs identified as part of the initial screening will be refined based on comparisons of maximum concentrations to refined ESVs presented in the BERA WP or developed as part of an interim deliverable submitted to EPA. An interim deliverable will be prepared for EPA review to support the selection of revised ESVs from a range of no observed effect concentrations (NOECs).

Constituents without ESVs will be retained for further evaluation in the BERA.

The COPEC refinement section of the BERA WP will not be used to eliminate constituents from further consideration in the BERA prior to the evaluation of Phase II data; however, the results of the COPEC refinement process will be retained in the BERA WP to provide context for those constituents that are likely to be focal COPECs in the BERA process.

8) Section 3.4 (Page 22) – While it may be appropriate to consider background concentrations in the BERA to determine if risks are Site-related, a suitable background dataset and adequate characterization of the variability of Site conditions has not been completed. As stated in USEPA (2001), "It is important to note that this guidance adopts the presumption that all data used in the SLERA are of adequate quantity and quality, and if data deficiencies are identified, either further data collection will be undertaken or other means employed to more fully characterize exposures (e.g., fate and transport modeling)." As stated in Section 4.1 of the workplan, "The number and distribution of sampling stations within aquatic and transitional exposure areas in the Phase I Site Characterization were considered adequate for the purposes of the SLERA; however, the spatial representativeness of soil samples to characterize exposure was considered insufficient in some terrestrial exposure areas. Due to the limited spatial distribution of soil data, insufficient data were available to screen and eliminate exposure areas from further consideration." USEPA (2001) also states that "[c]onsideration of background assumes that background contaminant levels have been properly determined." Section 4.1 of the workplan concludes that additional characterization of background conditions is needed to support the

BERA Because it has been recognized that a robust background dataset is needed, it is not appropriate to eliminate COPECs in the BERA workplan using the existing background dataset.

Further characterization of site and background conditions will be conducted in the Phase 2 investigation. Additional characterization sampling will be conducted to address SLERA data gaps identified in Section 4.1 of the BERA WP to further characterize site conditions. In addition, a background study will be discussed in the Phase 2 SAP and detailed in a separate Background Investigation SAP to provide a robust background dataset for comparisons to site data.

Representative regional background concentrations for metals were estimated in the BERA Work Plan to provide regional context to refined soil criteria (see Section 3.4.3.1). Analyses of unimpacted soils collected as part of the MDEQ Montana Soil Background Investigation (MSBI) were used to represent regional background conditions. Representative regional soil concentrations were estimated based on mean concentrations, as a measure of the central tendency of the MSBI dataset, to provide a conservative estimate of regional soil conditions. The refined ESV used in the COPEC refinement presented in the BERA WP was selected as the greater value between the refined soil screening criterion (based on the minimum Eco-SSL and ECORISK Database values) and the mean MSBI.

EPA Response: Justification for this approach is needed. Simply using the less conservative toxicity value does not represent an improvement in screening values, it just means that screening values are less conservative, not that they are more appropriate to use given the receptors anticipated to be at the Site.

Roux/EHS Response: As stated in the response provided for Comment #7, an interim deliverable will be prepared for EPA review to support the selection of revised ESVs from a range of NOECs.

The refinement of metal COPECs based on mean MSBI concentrations will not be used to eliminate individual metals from further analysis in the Phase 2 investigation. Individual metals included in the analytical suite proposed in the Phase 2 SAP will be analyzed and re-screened based on the combined Phase 1 and Phase 2 data for each exposure medium sampled within each exposure area (see response to Comment #7). Further evaluation of metals concentrations relative to representative background concentrations will be conducted in the BERA based on data collected as part of a background study that will be proposed in the Phase 2 SAP.

EPA Response: Because refinement of metal COPECs based on mean MSBI concentrations will not be used to eliminate individual metals from further analysis in the Phase 2 investigation, it is unclear what the purpose is of this evaluation.

Roux/EHS Response: In the absence of a site-specific background dataset, the MSBI data (mean values) were used to provide regional context to the concentrations of metals COPECs measured in soil samples collected at the Site. Although no metal COPECS will be eliminated from further consideration based on this refinement, the evaluation provides useful information in the BERA WP for understanding which metals have the potential to be focal COPECs in the BERA process. In the BERA, the background soil datasets that are proposed in the Phase II Sampling and Analysis

Plan (SAP) will be used in lieu of the MSBI data to provide regional context for metal COPECs in soil.

9) Section 3.4 (Page 22) –Essential nutrients may be excluded in the BERA if it can be demonstrated that Site concentrations are less than ecological screening values (ESVs) and/or equal to or less than background. Because an adequate background dataset is not currently available, it is not appropriate to include this evaluation in the BERA workplan.

Like the analysis of regional background concentrations for other metals, conservative estimates of regional concentrations were used to provide regional context to site concentrations of essential nutrients in site soils and sediments. Regional data compiled by the USGS for western conterminous U.S. soils were evaluated to assess the need for further evaluation of essential nutrients. The results of these analyses indicated that the ranges of essential nutrient concentrations in site surficial soils and sediments were within the geometric mean +/- geometric standard deviation of western conterminous U.S. soils for essential nutrients other than calcium.

The refinement of essential nutrient COPECs based on regional USGS data will not be used to eliminate individual constituents from further analysis in the Phase 2 investigation. Essential nutrients included in the analytical suite proposed in the Phase 2 SAP will be analyzed and re-screened based on the combined Phase 1 and Phase 2 data for each exposure medium sampled within each exposure area (see response to Comment #7). Further evaluation of essential nutrient concentrations relative to representative background concentrations will be conducted in the BERA based on data collected as part of a background study that will be proposed in the Phase 2 SAP.

10) Section 4.1 (Page 31) – The SLERA data gap analysis does not include collection of data in support of lines of evidence beyond a hazard quotient (HQ) evaluation. It is suggested that other lines of evidence be included in the Phase II Characterization SAP and prior to the Tier 3 analysis. These other lines of evidence may include toxicity testing, population evaluation, and habitat evaluation.

The conceptual BERA investigation presented in the BERA WP is based on a tiered approach to assess the bioavailability and toxicity of COPECs in aquatic and terrestrial exposure areas. Tier 1 analysis includes basic characterization and HQ evaluation based on total recoverable concentrations in samples of site soil, sediment, and surface water. Tier 2 analyses are proposed as an initial evaluation of COPEC bioavailability and toxicity to determine the need for Tier 3 analyses that may include toxicity testing, population evaluation, habitat evaluation, etc. The outcome of Tier 2 analyses will also be used to inform the design of potential Tier 3 analyses to improve the effectiveness and efficiency of site-specific studies to directly measure the bioavailability and toxicity of COPECs in site media. Data collected as part of Tier 2 analyses may also be used to evaluate whether further Tier 3 risk analyses would be cost-beneficial or if remedial actions should be considered in lieu of additional study. As stated in the BERA WP, if Tier 3 analyses are warranted, a BERA WP Addendum will be submitted to establish data objectives, specify the study design and testing methods, and establish decision criteria for the weight-of-evidence evaluation.

11) Section 4.2.1 (Page 33) – Revise the workplan to include a discussion of the temporal adequacy of the data available for the BERA. Recognizing that groundwater discharges to the Flathead River, and it has been noted that groundwater fluctuates seasonally, having only one sample of surface water at a location for each season is not adequate for characterization of potential long-term effects to aquatic receptors.

A temporal analysis of available surface water and groundwater data will be conducted as part of the Revised BERA WP to evaluate the temporal adequacy of data available for the BERA. If warranted, recommendations for the need additional sampling to address temporal adequacy will be included in the Phase 2 SAP.

12) Section 4.2.1 (Page 33) - It is suggested that additional surface water and sediment data be collected to address uncertainties associated with temporal variability in surface water and sediment concentrations. Further, the following statement, "Phase I Site Characterization sediment and surface water data was considered adequate to characterize aquatic and transitional habitat in the SLERA" should be removed unless the temporal adequacy of the data can be demonstrated.

As stated in the response to USEPA Comment #11, a temporal analysis of available surface water and groundwater data will be conducted as part of the Revised BERA WP to evaluate the temporal adequacy of data available for the BERA. The total recoverable concentrations of inorganic and non-volatile organic COPECs in bulk sediment within aquatic and transitional habitats are not expected to vary seasonally; therefore, no additional sediment data will be collected to evaluate seasonal variability in total recoverable sediment concentrations. If warranted, recommendations for the need additional surface water sampling to address temporal adequacy will be included in the Phase 2 SAP.

EPA Response: Why is it assumed that "The total recoverable concentrations of inorganic and non-volatile organic COPECs in bulk sediment within aquatic and transitional habitats are not expected to vary seasonally"? Sediment concentrations can absolutely vary temporally (season and/or flow). Until this assumption is demonstrated, sediment data collection should continue.

Roux/EHS Response: Sediment samples collected as part of the expedited risk evaluation of the South Percolation Pond Area or proposed in the Phase II SAP to address spatial and/or statistical uncertainties will provide additional sediment data to evaluate potential temporal variability in sediment concentrations within aquatic and transitional exposure areas. In addition to the data collected during the Phase I Site Characterization, additional sediment samples have or will be collected within the following aquatic or transitional exposure areas:

- Cedar Creek (n=6)
- Flathead River (n=11)
- Backwater Seep Area (n=7) (collected as part of the 2017 expedited risk assessment field work)
- South Percolation Pond Area (n=9) (collected as part of the 2017 expedited risk assessment field work)
- North Percolation Pond Area (n=6)
- Northern Surface Water Feature (n=10)

An evaluation of temporal variability in sediment concentrations will be included in the uncertainty analysis presented in the BERA.

13) Section 4.2.1.2 (Page 34) – The assumption that exposure to burrowing mammals at depths greater than two feet is not significant relative to the zero to two-foot interval requires clarification and justification. The first full paragraph on page 34 is unclear regarding ingestion of burrowing mammals. If this statement is based on the presumption that the majority of the contamination is present in the zero to two-foot interval, then this needs to be demonstrated. If this is based on the presumption that the majority of soil ingestion by burrowing mammals occurs in the zero to two-foot interval, then a citation is needed to justify this statement. Please clarify the intent of this information and provide justification as appropriate.

The BERA WP will be clarified to indicate that, based on the ecological conceptual site model (ECSM) for the Site, burrowing mammals are not expected to experience greater exposure to subsurface soil [> 2-ft below ground surface (bgs)] relative to exposure to surface soils (0-2-ft bgs). Burrowing mammals are primarily exposed to subsurface soils through three pathways: dermal contact, inhalation, incidental soil ingestion (USEPA, 2005). Dermal contact is not likely to be significant pathway to subsurface soils due to the presence of fur on mammals that mitigate direct contact exposure (USEPA, 2005). Inhalation pathways are not considered to be significant due to the infrequent detection and low concentrations of volatile organic compounds (VOCs) in subsurface soil. Further, per USEPA (2005), the inhalation of respirable dust particles is not expected to contribute significantly to the total daily dose of metal and organic constituents [e.g., < 0.01 percent of the total daily dose to meadow vole (USEPA, 2005)]. The incidental ingestion of soil particles through foraging activities and the inhalation of non-respirable dust will be accounted for in soil ingestion rates used to evaluate overall ingestion pathways (see equation on page 45 of the BERA WP).

Consistent with the ECSM, exposure to subsurface soils (> 2-ft bgs) through incidental ingestion pathways are not likely to result in greater exposure relative to incidental ingestion of surface soil (0-2-ft bgs). Data will be presented from the Phase 1 investigation to indicate that COPEC concentrations are greater in surface intervals and decrease with increasing soil depth. Based on these vertical concentration gradients in soil, the evaluation of direct and incidental ingestion pathways within the 0-2-ft bgs interval is considered adequate and appropriate to evaluate potential exposure to burrowing terrestrial mammals in the BERA. The BERA WP will be clarified and additional justification will be provided to support the approach for evaluating potential exposure to burrowing mammals at the Site.

14) Section 4.2.2.1 (Page 35) – The workplan only discusses surface water exposures for aquatic receptors; there is no discussion of how water ingestion exposures will be evaluated for wildlife. Revise the workplan to include a discussion of wildlife exposures to surface water. For aquatic receptors, it is appropriate to evaluate exposure using the dissolved concentration, however, for wildlife surface water ingestion, the total recoverable concentration should be used.

The BERA WP included the direct ingestion of surface water by terrestrial wildlife as a complete exposure pathway for aquatic and terrestrial exposure areas where surface water bodies are

present on the Site (see Figures 4 and 5). The BERA WP will be clarified to clearly indicate that this pathway will be assessed in the BERA. Consistent with the exposure model presented on page 45 of the BERA WP, the total recoverable (unfiltered) concentration will be used in the estimate of the estimated daily dose contributed by the ingestion of surface water as drinking water.

EPA Response: Clarify what is meant by "where surface water bodies are present". Is this implying that if an exposure unit is not adjacent to a water body, surface water will not be included as a compete pathway for receptors in that exposure unit? Inclusion of surface water as an exposure medium is appropriate for wildlife (terrestrial and semi-aquatic) that may ingest water at the Site given the potential size of wildlife receptor's home ranges.

Roux/EHS Response: The BERA WP will be clarified to indicate relevant surface water (drinking water) sources for terrestrial wildlife receptors in the dietary exposure models. For large ranging receptors, potential drinking water sources may include a conservative estimate of average exposure point concentrations (e.g., upper confidence limit of the mean) from multiple surface water features that may be encountered while foraging. For receptors with small home ranges, surface water features within or adjacent to terrestrial exposure areas will be considered the primary drinking water source. It will be assumed that semi-aquatic receptors obtain drinking water from the aquatic or transitional exposure areas from which dietary and incidental ingestion exposure pathways are evaluated.

15) Section 4.2.3 (Page 38) – The proposed delay in collecting additional background data until the BERA is completed is inappropriate. If risks are above a level of concern, the BERA will need to have a background evaluation to provide a frame of reference for Site risks and inform risk management decisions about whether risks are Site-related. It is highly unlikely that HQ estimates in the BERA will below a level of concern for all receptors for all COPECs; therefore, background data will likely be needed for the BERA, which means they should be collected now (before the BERA).

The Phase 2 SAP will include a background study to provide a robust background dataset for comparisons to site data.

16) Section 5.1.1.2 (Page 41) – The workplan indicates that "[f]or these hardness-dependent metals, effects endpoints will be based on the geometric mean of spatially and temporally-paired hardness measurements. Hardness values from each exposure area for a given sampling event will be pooled and the geometric mean hardness value will be used in the calculation of hardness dependent criteria for metals." However, the preferred approach is to use sample-specific hardness measurements for calculating a sample-specific hardness-based criteria. If sample-specific hardness measurements have not been collected, then the proposed strategy may be employed. Please revise the workplan accordingly. The uncertainties associated with the use of hardness data that is not sample-specific should be discussed in the BERA.

The BERA WP will be revised to indicate that hardness-dependent criteria for metals will be derived on a sample-by-sample basis. The BERA WP will present relevant equations for hardness-dependent criteria and example criteria for a representative hardness concentration

(e.g., 100 mg/L as $CaCO_3$). Sample-specific calculations of hardness-dependent criteria for metals will be appended to the BERA report.

EPA Response: Suggest using the minimum measured hardness value for the Site because as hardness decreases, toxicity increases.

Roux/EHS Response: The derivation of hardness-dependent surface water quality criteria for metals should be based on representative hardness data for each exposure area and sampling event to account for potential spatial and temporal variability in hardness and filtered (dissolved) metals results. As suggested in the EPA response above, the application of a minimum hardness value for the Site to calculate hardness-dependent surface water quality criteria will provide the most conservative comparison to surface water quality criteria; however, this comparison may not accurately reflect the potential toxicity of hardness-dependent metals because it does not reflect spatially and temporally paired criteria with filtered metals concentrations. The use of a minimum hardness value for the Site without regard to spatial and temporal variability would introduce unnecessary uncertainty (biased towards overestimating exposure) into the surface water exposure evaluation.

In the BERA WP, Roux/EHS Support initially proposed the use of a of representative statistic (e.g., geometric mean) of spatially and temporally-paired hardness measurements to calculate hardness dependent surface water criteria for each exposure area and sampling event. However, based on EPA comments on the BERA WP, Roux/EHS Support agreed to calculate sample-specific hardness dependent criteria to address concerns regarding the use of the geometric mean as a representative hardness value. If the geometric mean is not acceptable to EPA as a representative hardness value in the calculation of hardness-dependent surface water criteria, Roux/EHS Support prefer to calculate sample-specific criteria to more accurately reflect spatially- and temporally-paired hardness dependent criteria and filtered metals concentrations. The sample-specific approach is preferred over introducing unnecessary uncertainty by assuming the minimum hardness value for Site in calculating hardness-dependent criteria for metals.

17) Section 5.1.2 (Page 43) – Please add TechLaw (2008) to the list of dose-based TRV sources for low observed adverse effect level (LOAEL) values. This is a global comment.

The LOAELs provided in TechLaw (2008) will be considered in the list of possible sources of dose-based toxicity reference values (TRVs) for evaluating dietary exposure estimates. A copy of this source was provided to EHS Support by Erin Formanek (CDM Smith) on January 17, 2018.

18) Section 5.2.1 (Page 44) – Because the variability of the incremental sampling methodology (ISM) dataset for an exposure unit is unknown, the 95UCL on the mean should be based on the Chebyshev upper confidence limit (UCL) per Interstate Technology Regulatory Council (ITRC) ISM guidance (ITRC 2012).

The preference for the use of the Chebyshev upper confidence limit (UCL) will be considered in the estimation of soil exposure point concentrations (EPCs) for the ISM dataset per ITRC ISM guidance (ITRC, 2012). However, the selection of the UCL value will also consider the

characteristics of the underlying dataset and recommendations for the selection of an appropriate UCL provided by EUSPA ProUCL software.

19) Section 5.2.3.2 (Page 45) – Please include a summary of the dietary exposure parameters for each surrogate receptor.

Dietary exposure parameters for each surrogate receptor will be summarized in an interim deliverable to USEPA prior to the initiation of dietary exposure modeling for the BERA. The BERA WP will be revised to note that this information will be submitted as an interim deliverable.

20) Section 5.2.3.2 (Page 46) – Please include a summary of the uptake models that will be selected to estimate dietary item tissue concentrations.

Uptake models that will be selected to estimate dietary tissue concentrations will be summarized in an interim deliverable to USEPA prior to the initiation of dietary exposure modeling for the BERA. The BERA WP will be revised to note that this information will be submitted as an interim deliverable.

21) Section 5.4 (Page 47) – Uncertainties associated with the representativeness of the data, exposure pathways not evaluated, chemicals not detected, absence of toxicity data, the interaction of chemicals, and the use of only one line of evidence (if the HQ approach is the only line of evidence evaluated) should be included in the BERA uncertainty assessment.

The additional elements of uncertainty identified in USEPA Comment #21 will be incorporated into the uncertainty analysis presented in the Revised BERA WP and BERA Report.

22) Section 5.6 (Page 48) - Recognizing that it is unlikely that an HQ evaluation will result in no predicted risks, additional lines of evidence (e.g., population studies, toxicity tests, habitat evaluations) should be considered in the Phase II sampling so that the BERA summary and conclusions can be strengthened prior to Tier 3.

As stated in the response to USEPA Comment #10, the conceptual BERA investigation presented in the BERA WP is based on a tiered approach to assess the bioavailability and toxicity of COPECs in aquatic and terrestrial exposure areas. Please refer to the response to USEPA Comment #10 for the proposed approach.

Figures

23) Figure 4 through Figure 6: The open circles used in the figures represent a combination of potential exposure pathways that are likely insignificant or not quantifiable. Please modify these figures to use two different symbols, so that it is clear which pathways are likely insignificant and which are not quantifiable.

The ecological conceptual site model (ECSM) figures will be modified to differentiate between pathways that are likely insignificant and pathways that are not quantifiable.

24) Figure 6: Terrestrial birds and mammals may be exposed via ingestion of Site surface water, yet the presentation does not include this exposure scenario. Please modify this figure to include this exposure scenario.

The direct ingestion of surface water by terrestrial wildlife is included in the BERA WP as a complete exposure pathway for aquatic and terrestrial exposure areas where surface water bodies are present on the Site (see Figures 4 and 5). The BERA WP will be clarified to clearly indicate that this pathway will be assessed in the BERA.

EPA Response: See comment #14 for requested clarification.

Roux/EHS Response: See response to Comment #14.

25) Figure 5 and Figure 6: These figures show there are no complete pathways for wildlife exposures to subsurface soil. The workplan appears to be internally inconsistent with regard to the presence of burrowing mammals at the Site. As noted in a previous comment, further justification is needed to support the absence of subsurface soil exposures by burrowing mammals.

Consistent with the responses to USEPA Comments #13 and #23, the ECSM figures will be revised to indicate that exposure pathways to subsurface soil (> 2-ft bgs) are complete, but insignificant for potential burrowing mammals present at the Site.

References:

USEPA. 2015. Region 4 Ecological Risk Assessment Supplemental Guidance. Interim Draft. U.S. EPA Region 4. August 2015.

USEPA. 2008. Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, Biphenyls in Ecological Risk Assessment. EPA/100/R-08/004. June 2008.

USEPA. 2005. Guidance for Developing Ecological Soil Screening Levels. OSWER Directive OSWER Directive 9285.7-55. February 2005.

USEPA. 2000. Amended Guidance on Ecological Risk Assessment at Military Bases: Process Considerations, Timing of Activities, and Inclusion of Stakeholders. U.S. EPA Region 4.

ITRC (Interstate Technology Regulatory Council). 2012. Incremental Sampling Methodology. Prepared by the IRC ISM Team. February.

TechLaw. 2008. Close-out Letter for Calculating Effect-based Ecological Soil Screening Levels for Fort Devens Ayers, MA. Memorandum from Stan Pauwels (TechLaw) to Bart Hoskins (EPA Region I) dated November 18, 2008. TDF No. 1216, Task Order No. 26, Task No. 01.

TSERAWG. 2008. A Guide to Screening Level Ecological Risk Assessment. Tri-Services Environmental Risk Working Group (TSERAWG). TSERAWG TG-090801. September 2008.

U.S. Navy. 1999. Navy Policy for Conducting Ecological Risk Assessments. Office of the Chief of Naval Operations, Washington D.C.