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November 18, 2015

Re: Response to Comments on RI/FS Work Plan and SAP
Columbia Falls Aluminum Company

Roux Associates, Inc. (Roux Associates), on behalf of Columbia Falls Aluminum Company (CFAC), has prepared this response to the written comments provided by USEPA in the letter from CDM Smith dated November 12, 2015. Each of the comments provided by CDM Smith is presented below, followed by Roux Associates' response.

General Comments

1) Sediment Porewater – There is still mention of the collection of sediment porewater in the Phase I Site Characterization SAP. Please remove sediment porewater from the document as this medium will be sampled as part of the Phase II Site Characterization.

   References to collection of sediment porewater samples have been deleted from the Phase I Site Characterization SAP, primarily in Section 6.5. Sediment porewater is mentioned only in reference to an overall objective of the RI/FS. Section 4.2 of the SAP discusses that sediment porewater will be collected during the Phase 2 investigation.

2) Additional information has been provided in the revised RI/FS Work Plan to describe the Conceptual Site Model and how the risk assessments will be performed. In general, these revisions adequately respond to comments made on the Draft RI/FS Work Plan. A few additional questions on the revisions and editorial issues remain and are incorporated into the specific comments that follow. Similarly, additional information has been provided in the revised SAP and in general adequately addresses comments made on the Draft SAP. However, some of the statistical evaluations and comparisons discussed in the SAP may not be appropriate or adequate. These issues are also incorporated into the specific comments that follow.

   Comment acknowledged. Roux Associates has provided a response to each of the additional specific comments below.

Specific Comments

1) RI/FS Work Plan Section 2.6, page 11 – Please replace the sentence "However, because the species of concern are listed by county, it cannot be definitely determined which species can be found within the Site boundary," with an explanation that a site-specific survey will be performed to determine the presence or potential presence of species of concern.

The language in the RI/FS Work Plan Section 2.6 was modified as requested.

2) RI/FS Work Plan Section 2.6, page 13 – The reference for FWP should be provided.

   The FWP is referenced in Section 2.6 on page 11.

3) RI/FS Work Plan Section 2.8.9, page 23 – Please state that values were below residential RSLs. It is not correct to state that samples were in compliance with residential risk-based criteria since these screening values are not regulatory compliance values.

   The language in RI/FS Work Plan Section 2.8.9 was modified as requested.

4) RI/FS Work Plan Section 2.8.14, page 24 – Please clarify the last two bullets. Are targets potential receptors? The meaning of this phrase is not clear: "*…and pathways by which they may be or are being transmitted*". Also, unless biota samples are collected it would not be possible to determine if receptors "*have actual contamination*".

   The language in question in Comment #4 is directly quoting the stated objectives from the Site Reassessment Report prepared by Weston (2014) on behalf of the USEPA. By use of the term "targets", we believe that Weston (2014) was specifically referencing "targets" as defined in the USEPA Hazard Ranking System (HRS). We have left language unchanged since this is exactly what was stated by Weston on behalf of the USEPA.

5) RI/FS Work Plan Section 2.8.14, page 26, 3rd bullet – Please define 'low concentrations'. Last bullet – Clarify if "the potential impact to soil and air exposure pathways appear to be low" refers to all chemicals detected or VOCs only.

   The bullet discussing the VOC concentrations was modified to include the maximum concentration observed during the USEPA sampling efforts.

   The last bullet was referencing the language in Section 5.4.2 of the Weston (2014) Report, which states "Based on readily available information regarding current potential receptors and the limited soil sampling performed as part of this investigation, the potential impact to soil and air appears to be low." Based on the context of the section in the Weston (2014) report, it is assumed the language was referring to all chemicals. For clarity purposes, the statement in RI/FS Work Plan Section 2.8.14 was modified to present exactly what was stated by Weston on behalf of EPA

6) RI/FS Work Plan Section 2.8.14, page 26, last bullet – Please clarify if "the potential impact to soil and air exposure pathways appear to be low" refers to all chemicals detected or VOCs only.

   See the response to Comment #5 above.

7) RI/FS Work Plan Section 2.8.14, page 26, USEPA Site Reassessment, 2014, 1st bullet for residential well sampling – Please provide the range of detection limits for cyanide since all results were non-detect.

   The residential well sampling is discussed in RI/FS Work Plan Section 2.8.15. The 1st bullet was modified to include the range of detection limits for cyanide during the four rounds of residential well sampling.

8) RI/FS Work Plan Section 3.1.3, page 34 – Please describe the classes of analytes that were not detected or present at concentrations above drinking water standards.

   RI/FS Work Plan Section 3.1.3 was modified as requested.

9) RI/FS Work Plan Section 3.1.3, page 35 – Please clarify the statement "applicable groundwater and drinking standards".

   The statement referenced in Comment #9 was modified to reference the MDEQ water quality standards and the USEPA MCLs.

10) RI/FS Work Plan Section 3.1.5, page 36 – Please expand the discussion. Although pesticides may not be related to historical manufacturing and production operations they are related to Site maintenance operations and thus would be classified as Site-related. The discussion of pesticide data quality is not sufficient to conclude that results are a result of lab or other interferences.

    The language regarding lab interferences and historical operations was removed from the pesticide discussion in RI/FS Work Plan Section 3.1.5. As discussed during the technical meeting held on October 7 and 8, 2015 and described in Section 5.3.2 of the RI/FS Work Plan, Roux Associates will perform pesticide analysis on selected surface soil samples during the Phase I Site Characterization, which will allow for the determination if pesticides are a site-related COPC.

11) RI/FS Work Plan Section 3.2.6.3, page 50 – Please ensure that Section 2.8.15 is still a valid reference. It is suggested adding that seep water is tested for acute aquatic toxicity. It appears that chronic toxicity tests are not performed.

    The discussion of WET testing was moved to its own section in RI/FS Work Plan Section 2.8.16. The reference in Section 3.2.6.3 was changed. RI/FS Work Plan Section 3.2.6.3 was modified to state that seep water is tested for acute aquatic toxicity and also reflect the results observed to date.

12) RI/FS Work Plan Section 3.6.1, pages 61-62 – Please reference the June 2015 OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air and the June 2015 USEPA Vapor Intrusion Screening Level calculator as preliminary items To Be Considered (TBC) for evaluating soil vapor results. Please explain how soil vapor results will be screened using these TBCs.

The references in Comment #12 were added as TBCs in RI/FS Work Plan Section 3.6.1.

Evaluation of soil vapor will occur in steps throughout the remedial investigation. The Phase 1 Site Characterization will serve as a preliminary analysis, (as defined in the Technical Guide) to develop an initial understanding if there is a potential for human health risk posed by vapor intrusion. This will be done by screening with an landfill gas meter (measuring percent LEL and carbon dioxide) and PID at landfills and through passive vapor sampling near the UST and former drum storage areas, as described in Section 5.2.4 of the RI/FS Work Plan. These results will provide screening data for qualitative evaluation to indicate whether VOCs are present and potentially warrant further soil vapor investigation in Phase 2. In addition, groundwater and soil sampling results from the Phase 1 Site Characterization scope of work will be evaluated to determine the presence of volatile COPCs. The groundwater analytical results for VOCs, if detected, will be compared to the screening levels calculated using the Vapor Intrusion Screening Level (VISL) calculator to determine if, and to what extent, soil vapor sampling and analysis may be required as part of the Phase 2 Site Characterization.

13) RI/FS Work Plan Section 5.3.2, page 73 and SAP Section 4.6.1, pages 20 and 21 – Please add detail to the proposed method of double-cased well drilling to avoid cross-contamination into deeper water-bearing zones. Also, it is unclear how shallow contamination will be identified. Please clarify how shallow contamination will be identified to ensure the most protective drilling techniques are employed when drilling through confining layers.

Sonic drilling is an effective method for double casing (or triple casing, if necessary) wells to prevent cross contamination. The drilling involves advancing two casings during the drilling process. The inner (smaller diameter) sonic casing is advanced ahead of the outer casing, and associated core samples collected from within the inner casing allows for characterization of lithology. When a confining layer is encountered, the initial continuous coring within the inner casing establishes the depth of this layer. The overriding outer sonic casing is then advanced into the confining layer sealing off the upper aquifer. Drilling then continues by advancing the inner sonic casing to the desired depth where a well may be installed. After the well is set, the process is reversed by filling the annular space with grout and vibrating and extracting both the inner and outer casing. The well is therefore sealed and the upper water bearing zone was never in contact with the lower confined zone, and grout prevents any future conduit for cross contamination.

It is recognized that it may not be possible to visually identify shallow contamination. Therefore, the above referenced sections have been revised to indicate that at all deep monitoring well locations, where potential confining units beneath the water table are encountered during the drilling of pilot borings (as evidenced by lithology observed in the continuous core samples), double-cased sonic drilling procedures will be used to hydraulically isolate monitoring wells screened with the deeper glacial aquifer(s) from the overlying groundwater system; thereby minimizing any potential for cross contamination.

14) RI/FS Work Plan Section 5.3.3, page 81 – Will the additional soil borings at dry well locations be completed in Phase II? If not, please provide additional detail on timing of the data evaluation in order to select soil boring locations.

RI/FS Work Plan Section 5.3.3 was modified to clarify that the additional soil borings at dry well locations will be completed during Phase I. Dry well inspections/screening and sediment sample collection from dry wells will be conducted at the beginning of the investigation activities to allow time for evaluation of data and selection of boring locations to be drilled and sampled during Phase I.

15) RI/FS Work Plan Section 5.5, page 84 – Typically a goal of collecting background samples is not to identify additional source areas. Provide a contingency plan (e.g., collect more background samples) if additional source areas are identified in the "background" locations.

RI/FS Work Plan Section 5.5 was modified to include language stating that if new source areas are identified in the "background" locations, then additional background locations will be selected in consultation with the USEPA.

16) RI/FS Work Plan Section 5.7, pages 88-89 and SAP Section 4.11, page 30 – Please indicate that the fate and transport evaluation will start during Phase I and be continued subsequent to collecting hydrogeologic data during Phase II. Hydrogeologic data collected must be incorporated into the fate and transport evaluation.

RI/FS Work Plan Section 5.7 and SAP Section 4.11 were modified as requested.

17) SAP List of Acronyms – Please revise the List of Acronyms to define ~~CPOC~~ COPC as "~~Chemicals~~ Contaminants of Potential Concern" (emphasis added). Please also add Target Compound List (TCL) to the List of Acronyms.

The SAP list of acronyms was modified as requested.

18) SAP Section 4.6.1, page 19: Please describe how the specific depths soil samples will be collected that will aid in determining the nature and extent of contamination. Also, please provide an alternative to allow for additional opportunistic soil samples that may be collected at the discretion of the field team if contamination is evident or likely at different depths including deeper than twelve feet, conditions indicate the possibility of preferential pathways, or conditions prevent sampling at the listed depths.

Additional language was added to SAP Section 4.6.1 that describes how the specific depths of soil sampling will aid in determining the nature and extent of contamination.

Additional language regarding opportunistic sampling was added to SAP Section 4.6.1 as requested.

19) SAP Section 4.6.1, page 21 - Borings must be abandoned using grout or bentonite chips in accordance with Roux SOP 10.3. The top three feet of each boring may be backfilled with soil.

SAP Section 4.6.1 was modified to in accordance with Comment #19.

20) SAP Section 4.6.2, page 21 – The ISM design outlined in the SAP will not be adequate to estimate the mean soil concentration for a decision unit given that only one replicate per decision unit will be collected. As stated in ITRC (2012), "a single ISM result is likely to underestimate the mean more than 50% of the time for most distributions; the likelihood of a decision error increases as the variance in the distribution increases and the difference between the action level and true mean decreases". As such, the data that will be collected will not be adequate for ecological risk evaluation.

Regarding decision units, there is no basis for the selection of one-acre. It is highly likely that there are ecological receptors with home range sizes that are smaller than this (e.g. a quarter acre for a shrew, a common small home range surrogate receptor). Therefore, one incremental sample (one replicate) from an area four times that of the home range of the smallest receptor is not sufficient for ecological risk evaluation. Subsequent data will need to be collected as part of focused future investigations in areas of adequate ecological habitat and where concentrations in initial samples are near threshold values.

The RI/FS Work Plan and SAP have been revised to indicate that the Operational Soil Area will have two different types of decision units. The entire area can be treated as a decision unit, with 43 individual sampling units from which incremental soil samples will be collected. This approach is beneficial because there is no specific source area that has been defined within the Operational Soil Area. This approach will allow for calculation of the mean soil concentration and 95% UCL of the mean for all analytes across the area based upon 43 ISM sample locations. These data can be used in comparison to background concentrations, as well as to compare maximum concentrations detected in entire dataset to conservative screening criteria.

With respect to the one acre decision units, it is recognized that this area exceeds the small home ranges associated with some potential ecological receptors. However, it is anticipated that the one-acre decision units exhibiting the highest concentrations and with potential higher habitat value, can be those that become the primary focus of future investigation, if necessary during Phase 2.

Regarding the average concentration providing value to the evaluation of the CTE receptor in the BHHRA, the 95 UCL of the mean is required by EPA for risk calculations. Computing a 95 UCL of the mean is possible because is it likely that the decision unit for a human receptor is greater than one acre. It is important to note that the difference between CTE and RME risk estimates lies in the exposure parameters assumed for each, not the basis of the exposure point concentration.

Comment acknowledged.

21) SAP Section 4.6.3, page 22 – Typically a goal of collecting background samples is not to identify additional source areas. A contingency plan for collecting additional background samples should be discussed in the event that the selected locations identify other source areas as mentioned in the list of goals for the background area soil investigation.

SAP Section 4.6.3 was modified to include similar to the RI/FS Work Plan as discussed in Comment #15.

22) SAP Section 5.1, page 23 - Add SOP for the handling of IDW (in the event disposable equipment is used).

As described in Section 5.2.6 of the RI/FS Work Plan, an IDW Plan, which will include a section on handling disposable equipment, will be submitted to the USEPA as an addendum to the Phase I Site Characterization SAP prior to the start of field work.

23) SAP Section 6.5.2, page 44, Question 3 – Based on the number of samples specified for some media (e.g., surface water, sediment) statistical comparisons with reference concentrations will not be possible. It will likely be necessary to perform other types of comparisons which are not as robust as statistical comparisons.

Comment #23 is acknowledged.

24) SAP Section 6.5.2, page 44, Question 5 – Please include in this question the possible movement of COPCs offsite.

SAP Section 6.5.2, Question #5 was modified.

25) SAP Section 6.5.3, page 46, 1st bullet – This statement does not seem to adequately address potential offsite contamination as the characterization appears to end at the Site boundary.

Characterization of COPCs during the Phase I Site Characterization is limited to within the Site boundary. Review of the Phase I data will be used to determine if there is need to extend investigations beyond the Site boundary during subsequent phases.

26) SAP Section 6.5.3 page 46, Section 6.5.5, page 54 – The information inputs and analytical approach for the decision statement (Determine if COPC concentrations in Site surface soil, subsurface soil, surface water, sediment porewater, sediment, and groundwater are statistically greater than reference concentrations and are identified as Site - related COPCs.) are not valid. It is not appropriate to compare the maximum concentration for Site media to a 95 UCL of the mean for reference media.

One of the biggest limitations of the judgmental sampling design is statistical inferences are limited. However, for soil, Site data from a decision unit could be statistically compared to reference data in the determination of site-related impacts if the Site data were adequate. Currently, the sampling design does not allow this because only one replicate is being collected for soil, in some cases one duplicate is called for. If the data are indeed intended to be compared statistically to reference location data, a minimum of three replicates (or samples) per decision unit is required for Site locations. If those data are collected, they could be compared to reference data according to the following guidance: *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (USEPA 2002). USEPA's ProUCL software is a useful tool for computing the significance of these data.

SAP Section 6.5.3 was modified to describe that soil samples will be grouped into decision units following review of the Phase I data and during preparation of the Baseline Risk Assessment Work Plan. These decision units will likely correspond to the preliminary exposure areas described in Section 3.2 of the RI/FS Work Plan, which include the Main Plant Area, Landfill Area(s), Northern Percolation Ponds, Operational Soil Area and the Flathead River landside Area (including Southern Percolation Ponds and the Seep area). The above groupings will result in more than three samples per decision unit; typically many more than three samples (also see above response to Comment 20 regarding the consideration of the Operational Soil Area as a decision unit). The data from these groupings will be used to calculate the mean and 95 percent UCL of the mean for the COPCs within each decision unit; and these values will be compared to the mean and 95 UCL of the mean determined for background soil samples. USEPA's ProUCL software will be used to perform the calculations and to evaluate the significance of these data.

For other media types, decision units have not be clearly articulated at this time and the Site samples being collected are possibly biased due to the judgmental sampling design making statistical comparison to reference samples difficult. In addition, the number of reference samples slated to be collected may be inadequate for certain media types (a minimum of 3 is required). Section 6.5.3 should be revised so that adequate reference data are collected if indeed a comparison of Site versus reference is to be made with the data that are to be collected in Phase I.

As described in Section 6.5.3, groundwater, surface water and sediment will not have a sufficient number of background / reference stations to permit a statistical analysis of background concentrations. The concentrations measured at the background / reference stations will be compared directly to the maximum concentrations of COPCs measured at the Site to make an initial assessment of whether the COPCs appear to be Site-related and evaluate if additional background sampling is warranted.

27) SAP Section 6.5.3, pages 46-47, 2nd bullet – The statistical comparisons suggested in this bullet will need to be reevaluated. If site-specific background data are available use of regional background data (State of Montana) is unnecessary. It is not clear what is meant by background concentrations from this effort will also be evaluated in the context of prior

background soil sampling. If data are comparable it may be beneficial to combine datasets. Also it may not be appropriate to compare results from discrete samples with incremental sample results. When enough (e.g., at least 10) site observations are available, it is preferable to use hypotheses testing approaches for background evaluations. Different parameters should not be compared (e.g., averages with maximums). Averages should be compared with averages or UCLs, and individual site observations should be compared with upper prediction limits (UPLs), upper percentiles, upper tolerance limits (UTLs), or upper simultaneous limits (USLs).

For naturally occurring metals, the ranges of concentrations detected in the regional background studies can provide useful information to assess whether the site-specific background data is indicative of un-impacted / natural conditions; however, the regional background data will not be used in establishing site-specific background. The locations and data from prior background soil samples will be evaluated to determine if it would be beneficial to combine data sets. The other aspects of the above comment are acknowledged and will be considered in the evaluation of background conditions.

28) SAP 6.5.3, page 47 – Please describe what aquifers will be screened in the upgradient reference well. Discuss if reference surface water and sediment reference locations will be sampled as frequently as site locations.

Existing monitoring well W2-CFMW1, located north of the site and upgradient of all Site features, will be utilized as the reference location. This monitoring well was utilized as the reference location during the USEPA Site Reassessment conducted by Weston (2014). The monitoring well is screened at the water table, with the screen depth between 132 and 152 feet below land surface.

Reference surface water and groundwater locations will be sampled during each of the four sampling events. Sediment reference locations will be sampled one time.

29) SAP Section 6.5.6.5, pg. 61 – The last statement "the results from Phase 1 sampling around source areas will likely be biased high relative to average conditions within the source area" should be removed or revised as it is not entirely true. For soil in particular, as stated in a previous comment, "a single ISM result is likely to underestimate the mean more than 50% of the time for most distributions; the likelihood of a decision error increases as the variance in the distribution increases and the difference between the action level and true mean decreases" (ITRC 2012).

The last sentence has been removed from SAP Section 6.5.6.6.

30) SAP Section 6.5.6.2 (should be 6.5.6.7), page 62 – It is stated that "Quantitative analysis of decision error limits and uncertainty is not feasible when implementing a judgmental sampling program". It is recognized that meaningful quantitative analysis is difficult accomplish due to the nature of the data that are collected. However, if an adequate number

of replicates was collected for soil, the following is an example of decision error limits that would be applicable.

For the decision question where reference condition concentrations are identified and evaluated against Site data, the comparison of Site concentrations to reference concentrations assumes that concentrations are "Site-related" until proven otherwise. Thus, the null and alternative hypotheses are as follows:

> H_0: The analyte concentration in Site surface soil, subsurface soil, surface water, sediment, and groundwater are higher than reference; the analyte is a Site-related contaminant for that medium.
>
> H_A: The analyte concentration in Site surface soil, subsurface soil, surface water, sediment, and groundwater are less than or equal to reference; the analyte is not a Site-related contaminant for that medium.

Because a Type I error is the more severe decision error (i.e., an analyte would be dismissed as being Site-related when it could be present as a consequence of Site activities), the tolerable limit for α is set lower than for β. The decision error limits selected for this investigation are based on the minimum values recommended in EPA (2002a) for a Form 2 background test. Therefore, when making comparisons to reference, the probability of a Type I error should not exceed 10% ($\alpha = 0.10$) and the probability of a Type II error should not exceed 20% ($\beta = 0.2$).

As part of the development of the sampling plan described in the RI/FS Work Plan, CFAC reviewed the existing Site data and developed a sampling plan that is biased towards potential source areas. The sampling design calls for multiple samples to be collected around Site features and source areas, and comparison of maximum concentrations around these areas to the most conservative screening criteria. This design should result in a conservative approach for screening COPCs.

The above comment regarding quantitative analysis of decision error limits is acknowledged and will be considered in the evaluation of the Phase I data where possible. Please also see responses to Comment #26 and Comment #31, which are related to the overall sampling design.

31) SAP Section 6.5.6.2 (should be 6.5.6.7), page 62 – The following statement: "This approach is overall a very conservative approach and minimizes the potential for a Type 1 decision error (i.e., an analyte would be dismissed as a COPC when it could be of potential risk)" cannot be considered valid without first assuming that the variance in the distribution of COPC concentrations is low. If there is high variability and only one replicate is collected for soil, it is likely that concentrations will be underestimated resulting in an increased potential for a Type I error. For this reason, the soil sampling design should be reconsidered. Along those same lines, the variability of contaminant concentrations in other media should be considered. If there is high variability, is it appropriate to perform a COPC selection after data are collected in Phase I? Perhaps it is more appropriate to select groups

of chemicals to be carried forward in future investigations at this time rather than a finite list.

CFAC have modified the statement referenced above as follows: "This approach is overall a conservative approach that should minimize the potential for a Type 1 decision error (i.e., an analyte would be dismissed as a COPC when it could be of potential risk)." As described in the response to Comment 26, soil samples will be grouped into decision units such that more than three samples (typically many more) will form the data set for evaluating and screening of potential COPCs; and the majority of these locations will be within or adjacent to various Site features / potential source areas. With respect to groundwater, the majority of monitoring wells are located adjacent to and downgradient of the potential source areas. Therefore, it is a conservative approach to use the maximum concentrations detected in these samples for comparison to the most conservative screening criteria or background / reference samples.

CFAC disagrees that the sampling program design should be reconsidered.

32) SAP Table 1, Response to Specific Comment 91: Please clarify the method to be used for analysis of hardness. Revised Table 1 includes analysis of hardness by SM2340B, but the response to Specific Comment 91 indicates that method 200.7 will be used to analyze for hardness.

Hardness will be analyzed by method SM2340B, as indicated in Section 4 of the SAP and the SAP tables.