Record of Modification

Phase II Site Characterization Sampling and Analysis Plan Field Activities
Columbia Fall Aluminum Company RI/FS
Phase II SAP MOD #3

Instructions to Requester: **Submit to Roux RI Manager or Roux RI/FS Project Manager**
Roux RI Manager will maintain legible copies in a binder that can be accessed by personnel.

Project Work Plan/QAPP (check one):

[X] 2018 Phase II SAP

[ ] SOP (Title, # and approval date): _____

Requester: Laura Jensen, Project Hydrogeologist Date: July 31, 2018

Applicable section of SAP/SOP:

Phase II SAP, Section 4.5 (Soil Borings and Soil Sampling), subsection Nature and Extent of COPCs in Site Features

Description of Modification:

Select Phase II soil borings and additional proposed soil borings will be analyzed for total chromium and hexavalent chromium (Cr[VI]) in surficial and shallow soils.

Rationale for Modifications / Potential Implications of Modifications:

As part of the Phase I Site Characterization soil sampling program, Roux collected soil samples for total chromium to characterize the nature and extent of contaminants at the Site. As part of the draft Phase I Data Summary Report review, USEPA requested that concentrations for total chromium were compared to the more stringent criteria for Cr(VI) as a conservative measure since Cr(VI) was not analyzed at the Site, and since the valence state of chromium at the Site was unknown. Additionally, as part of the draft Baseline Human Health Risk Assessment Work Plan (BHHRA WP) review, USEPA requested that risk calculations assume the ratio of chromium occurrence at the Site for trivalent chromium (Cr[III]) to Cr(VI) as 6:1. As a result of the more stringent screening criteria and ratio, chromium was carried through as a contaminant of potential concern/contaminant of potential ecological concern (COPC) in many exposure areas as part of the preliminary screening in the draft risk assessment work plans.

In an effort to reduce uncertainty in the risk assessment results with respect to chromium in soil, CFAC proposes to develop a Site-specific ratio of Cr(VI) to Cr(III) by collecting soil samples to be analyzed for both total chromium and Cr(VI). It should be noted that no Cr(VI) is known to have been used in the aluminum manufacturing process (reduction process) or other processes onsite. Additionally, the process was a reduction process, and any chromium present would likely be reduced to Cr(III).

Plate 1 presents a thematic dot map of soil locations where concentrations exceed the USEPA RSLs for Cr(VI). As presented in Plate 1, all detections exceed the carcinogenic Residential RSL of 0.3 mg/kg and most exceeded the carcinogenic Industrial RSL of 6.3 mg/kg. The exceedances of the non-carcinogenic Residential RSL of 23 mg/kg are concentrated in the Main Plant Area and former Operational Area of the Site. No concentrations exceeded the non-carcinogenic Industrial RSL. Plate 1 also shows how the concentrations of chromium decrease with depth; the surface (0 to 0.5 ft) sample has the greatest number of exceedances, followed by the shallow (0.5 to 2 ft) sample. The intermediate depth samples had far fewer exceedances.

Proposed Modification Scope of Work:
Soil borings described in this modification are proposed with the intent to refine the understanding of the nature and extent of contaminants identified during the Phase I Site Characterization, and to generate a Site-specific ratio to better frame the results of the risk assessment.

For the purposes of generating a Site-specific ratio, two soil samples will be collected for laboratory analysis from each proposed soil boring advanced, including: a discrete surface soil sample will be collected from the interval of 0-0.5 ft-bls; and a discrete shallow soil sample from the interval of 0.5 to 2 ft-bls. Samples will be collected from these intervals to characterize soil quality conditions in the surface soil and shallow subsurface soil. As described in the Phase II SAP, soil borings intended to characterize the nature and extent of metals, including chromium, will be completed utilizing hand augers.

As presented in the Phase I Data Summary Report, Phase I investigation data indicate that COPC concentrations are greater in surface intervals and decrease with increasing soil depth. Therefore, sampling is proposed at the surface (0-0.5 ft-bls) and shallow (0.5-2 ft-bls) intervals. Consistent with the Phase I sampling procedures, opportunistic samples may be collected if contaminants are evident at different depths if subsurface conditions indicate the presence of preferential pathways, or if subsurface conditions prevent sampling at the pre-determined depths.

Additionally, based on these vertical concentration gradients in soil, the evaluation of direct and incidental ingestion pathways within the 0-2-ft-bls interval is considered adequate and appropriate to evaluate potential exposure to burrowing terrestrial mammals in the BERA. In addition, these data should be adequate and appropriate for evaluation of potential exposure to human receptors for the exposure scenarios to be evaluated within the risk assessment.

A ratio of Cr(VI) to Cr(III) will be calculated for each sample location. The 95% Upper Confidence Limit (UCL) on the mean of all the ratios will be calculated using ProUCL Software (ProUCL Software, Version 5.1.002, May 2016). For non-detect results, one half of the MDL will be used for the ratio calculation. The 95% UCL ratio will then be used to calculate estimated Cr(VI) and Cr(III) concentrations for all Phase I and Phase II samples that were only analyzed for total chromium. The variability within the entire dataset will be revisited in the Phase II Data Summary Report and in the risk assessment.

Total Chromium will be analyzed as Target Analyte List (TAL) metals via USEPA Method 6020A and Cr(VI) will be analyzed as USEPA Method 7199. Cr(III) will be calculated as the difference in concentration between total chromium and Cr(VI) results.

Data Quality Objectives:
The goals and scope of the additional onsite sampling to further characterize chromium were developed consistent with the DQOs outlined in the Phase II SAP.

As stated in the rationale section, ten surface soil samples and ten shallow soil samples will be collected from locations identified on Figure 1. A minimum of ten surface soil samples and ten shallow soil samples will be collected to ensure that statistics can be calculated, as recommended by ProUCL guidance. No Cr(VI) is known to have been used in the aluminum manufacturing process (reduction process) or other processes onsite. Additionally, the process was a reduction process, and any chromium present would likely be reduced to Cr(III). As a result, it is anticipated that hexavalent chromium will typically comprise a low percentage (i.e., less than 10%) of the total chromium concentrations measured at the Site. To confirm this assumption, Roux believes that ten sample locations (approximately 30% of the number of sample locations that exceeded non-carcinogenic Residential RSLs as described below) provides a representative percentage of samples to be collected from the northern portion of the Main Plant Area and former Operational Area that appear to contain elevated total chromium concentrations relative to the undeveloped areas of the Site.

CFAC/Roux compared the total chromium results from the Phase I to the USEPA Residential and Industrial RSLs for Cr(VI) (carcinogenic and non-carcinogenic, HQ=0.1) to determine the most appropriate areas to collect soil samples to be analyzed for total chromium and Cr(VI). As shown on Plate 1, 32 samples exceeded the non-carcinogenic Residential RSL of 23 mg/kg. The exceedances of the non-carcinogenic Residential RSLs were concentrated in the northern portion of the Main Plant Area and southern portion of the former Operational Area, and therefore, the ten proposed samples were placed throughout this area, since this is the area in which chromium concentrations appears to be elevated relative to undeveloped areas of the Site. Ten samples are representative of approximately 30% of the number of non-carcinogenic Residential RSL exceedances and provides a representative percentage of samples to be collected from the area that appears to be impacted relative to the undeveloped areas.

As stated in the Proposed Modification Scope of Work section, Phase I investigation data indicate that COPC concentrations are greater in surface intervals and decrease with increasing soil depth. Therefore, sampling is proposed at the surface (0-0.5 ft-bls) and shallow (0.5-2 ft-bls) intervals, which is consistent with the first two depth intervals of other samples collected during the Phase 1 and Phase 2 of Site Characterization. Consistent with the Phase I sampling procedures, opportunistic samples may be collected if contaminants are evident at different depths if subsurface conditions indicate the presence of preferential pathways, or if subsurface conditions prevent sampling at the pre-determined depths. Additionally, based on these vertical concentration gradients in soil, the evaluation of direct and incidental ingestion pathways within the 0-2-ft-bls interval is considered adequate and appropriate to evaluate potential exposure to burrowing terrestrial mammals in the BERA. In addition, these data should be adequate and appropriate for evaluation of potential exposure to human receptors for the exposure scenarios to be evaluated within the risk assessment.

A comparison of the Phase I and Phase II MDLs compared to the human health and ecological screening values are provided in the attached Table 1 and 2, respectively. The results indicate that the MDL for total chromium is slightly greater than the minimum ecological screening value (ESV), and that the anticipated MDL for hexavalent chromium is less than the screening criteria with the exception of the Protection of Groundwater RSLs, which is the minimum screening criteria.

As documented in prior data summary reports and Tables 1 and 2, there have been and will be some analytes for which the lowest MDLs achievable by the laboratory exceed the most stringent screening criteria. The actual MDLs achieved by the laboratory will continue to be evaluated in future data summary reports and the risk assessment, and situations where MDLs exceed the most stringent screening criteria will be discussed in the uncertainty section of the risk assessment.

Duration of Modification (Check one):

☐ Temporary

Date(s) _____

Sample Numbers Affected Existing Locations – CFSB-189, 205, 214, 273, 281

New Locations – CFSB-288, 289, 290, 291, 292

☒ Permanent (Proposed Text Modification Section) Effective Date: July 31, 2018

Proposed Text Modifications in Associated Document:

This form serves to document the change as described above, no document revisions are proposed.

Data Quality Indicator (check one) – Please reference definitions on next page for direction on selecting data quality indicators:

☐ **Not Applicable** ☐ **Reject** ☐ **Low Bias** ☐ **Estimate** ☐ **High Bias** ☒ **No Bias**

Roux Project Manager Approval: Laura Jensen *Laura Jensen* Date: July 31, 2018
(Roux RI/FS Project Manager or designate)

EPA Review and Approval: Mike Cirian Date: _____
(USEPA RPM or designate)

DATA QUALITY INDICATOR DEFINITIONS

Reject – Samples associated with this modification form are not useable. The conditions outlined in the modification form adversely affect the associated sample to such a degree that the data are not reliable.

Low Bias – Samples associated with this modification form are useable, but results are likely to be biased low. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimated low.

Estimate – Samples associated with this modification form are useable, but results should be considered approximations. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimates.

High Bias – Samples associated with this modification form are useable, but results are likely to be biased high. The conditions outlined in the modification form suggest that associated sample data are reliable, but estimated high.

No Bias – Samples associated with this modification form are useable as reported. The conditions outlined in the modification form suggest that associated sample data are reliable as reported.